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Pencil Points

PROGRESSIVE ARCHITECTURE

November, 1944

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DEC 6 1944

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Editors:
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Don Graf

Cover, Layout, Typography:
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Publishing Director:
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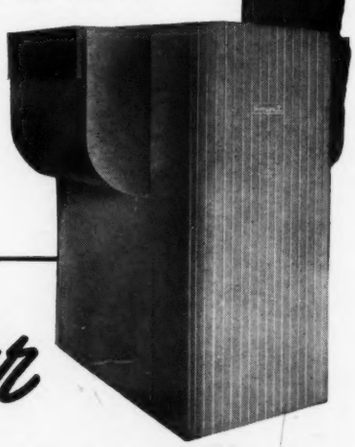

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Views

Opinions from readers

Remarks from the editors

Changes of address

THE PROFESSION AND ITS SERVICEMEN

by Lt. (j.g.) Lawrence A. Benenson, United States Coast Guard Reserve

The architectural profession has repeatedly asserted that it intends to help those servicemen who left architecture to serve their country. Privately and in print, leading architects who recognize that the readjustment to civilian life will be a difficult one for professional men have expressed themselves as being particularly anxious to see that postwar plans include some provision for those leaving the armed forces. Since the profession thinks that it can and should be of some service to these men, the following aspects of the problem should be considered for discussion and comment:

First, whom does it *intend* to help, and second, whom *can* it help?

The men who were inducted into service before they had a chance to complete their education will be provided for under the G.I. Bill of Rights. They will return to college under the aegis of the government, and will be given every opportunity to complete their formal training. The profession need not concern itself with them, with the following exception: when they return, they will be several years older, and more mature, having been through a variety of experiences, and they may be more impatient with so-called theoretical aspects of design. The schools would do well to recognize that these men will be anxious to enter the profession and earn a living, and therefore, in the light of unusual circumstances, the schools should modify curricula for them.

Another group for whom the profession will be able to do little will be those architects who were practicing for themselves when they entered the service. Realizing that in many cases the greatest sacrifice has been made by this group, their colleagues will nevertheless find it difficult indeed to be of much assistance. Professional ethics and other considerations seriously limit the practicability of much help in this direction. Perhaps the fairest solution which has yet been brought forward is the suggestion that new public works jobs be given to architect veterans whose practice and capabilities are adapted for this type of work. Possibly registers of ex-servicemen could be published by the various societies, which would serve to acquaint the public with the names of those who were in the armed forces.

The architectural profession should concern itself chiefly with aid to the many men who are not in either of the above categories. Those who had finished college, or who, self-educated, had acquired experience in various offices and were working toward registration and their own practices, should be assisted. These men would have advanced themselves sufficiently, both in learning and in years of apprenticeship, to meet the requirements of state registration examinations. Some possibly were prepared to practice before the war, but felt the time injudicious for taking the exam and opening an office. Others possibly have learned enough about construction from their work in the service to be able to cope with registration requirements. Unfortunately, the way the law is worded in most states, this type of experience will not count toward the goal. The majority, however, were counting on the training they would get from office and field practice, which they missed by being away. They have been held suspended for the duration, only to begin where they left off at the time when they were inducted. While the serviceman was busy defending his country, those who stayed at home were given every opportunity to advance themselves professionally and otherwise.

The average soldier, sailor, and marine will not resent this. He undoubtedly appreciates the fact that his sacrifice includes his own professional training. But he may very well resent arbitrary limitations upon his ambition to get registered; and the registration laws in most states have a definite time requirement before the applicant may even take his exam. This would not constitute a problem if the time were moderate, but in the states which require a definite amount of experience, it is from three to twelve years in most cases, depending on the education of the applicant, the architects he has worked for, etc.

If there were something definite and agreed upon about this matter, it might seem reasonable. Unfortunately, time requirements vary so among states that no one in his right mind would say that they all are correct. Nothing in the world seems so arbitrary as state boundaries when it comes to variations in laws regarding architects.

What can the profession do?

First, the schools (which may be considered part of the profession) should prepare intensive refresher courses in order to give returning servicemen a chance to reclaim their knowledge. The schools should also concentrate on night or extension courses in the practical aspects of architecture, to prepare men for registration exams. Secondly, the National Council of Architectural Registration Boards, or the A.I.A., or both, should standardize a registration examination with no arbitrary education or experience requirements, so worded as to quiz the applicants thoroughly on their knowledge of the profession. Third, and coupled with the previous suggestion, the various state architectural societies should apply pressure to their respective legislatures to accept this examination as equivalent to their own requirements.

The end result, that of easing the burden on the returning servicemen, would not be difficult to achieve by this means. In fact, all the instruments are set up, and it is only by small modifications of the existing procedures that the change might be effectively carried out. Almost all the architectural schools teach or have taught courses useful toward direct registration. Similarly, the N.C.A.R.B. gives an exam now that is fairly generally accepted. Unfortunately, this is not too well known, since the various states tend to emphasize their own examinations. Also, the N.C.A.R.B. requires an applicant to have completed three years of approved experience. The state societies would do very well to promote standardization of registration through acceptance of a universal yardstick, slanted directly toward helping the serviceman.

These three mediums, working together in a coordinated program, would provide a readily workable solution for the vast majority of men returning to architecture. The measures that these agencies take now would live long after them, and the men responsible would have the satisfaction of knowing that in addition to their assistance to fighting men, they have benefited the country, which will sorely need every capable architect it can get after the war.

Defending St. Louis' Recreation Area Plans

Dear Editor:

The review of the City Plan Commission's report, "Plan for Public Recreational Areas," which appears in the September 1944 issue of PENCIL POINTS, has been brought to my attention. Your favorable comment with respect to this report is appreciated.

Perhaps the critical comments in the review call for an explanation. Either the report fails to make clear the fact that we do not have a narrow concept of recreation, or the reviewer reached a too hasty conclusion. You can be the judge as to this. You will note that in this report we lay considerable stress on the use of schools for an extended community center program. The reviewer failed to take note of this. We have had several conferences with the Board of Education, which plans to expand considerably its program in this field.

Practically all recreation authorities agree on the use of public schools as the logical neighborhood community center. To attempt to develop inde-

(Continued on page 10)

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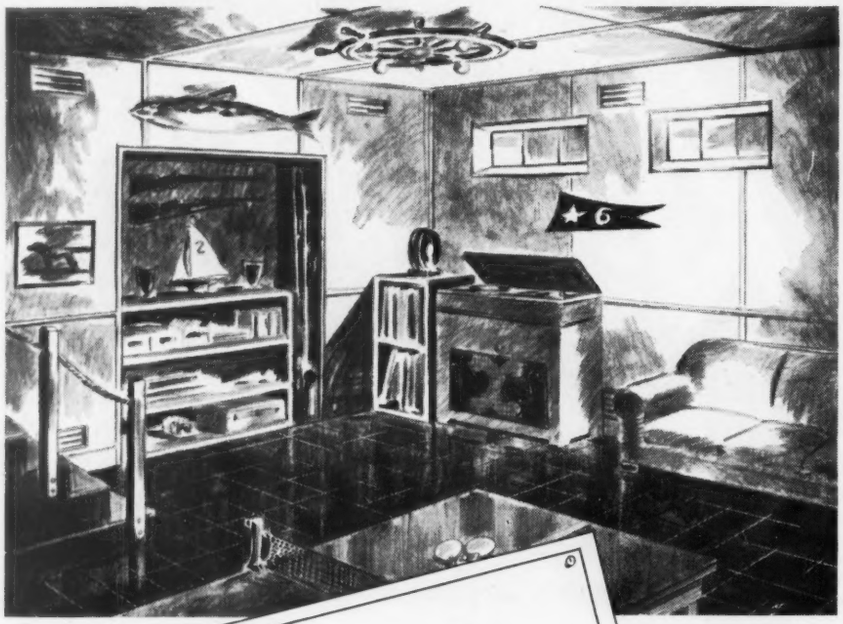

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Views

(Continued from page 8)

pendent community centers is both impractical and economically unwise.

In this report you will note also that we have a broad concept of neighborhood unit planning for the entire city, with a community center as well as plans for playgrounds, neighborhood parks, and playfields, for each neighborhood.

In view of the above, it seems a bit unfair to state that there is a "narrow conception of recreational needs and the poor consideration of future changes in demand" for any section of the City of St. Louis.

HAROLD BARTHOLOMEW, Engineer
City Plan Commission, St. Louis, Mo.

Travel IS Broadening

Dear Editor:

I am not an architect, not yet anyway. I have long wanted to be one, but my education was interrupted by this war. However, I don't think I've lost too much, since I am studying while in the army, through Army Institute correspondence courses. Then too, I have a chance to see other countries—their cities, towns, and homes. I think this has given me a wider outlook on architecture and a chance to see what other people of the world think and do along my line.

In your July issue, which I have just received, I noticed that a reader* contested the idea that young architects could learn much from their travels with the army. Maybe, in some cases, no, but I think in most cases, definitely yes. The reader enclosed, and you published, several pictures of "mud huts" that are typical of some backward countries. Apparently this reader could not, or did not have the chance, to see past the end of his nose. I am stationed "Somewhere in Assam, India." Here, too, are numerous "bashas" and "mud huts," but looking past them we can see more if we try. I had a furlough not so long ago, and went to the "Second City in the British Empire," Calcutta. Things there were very different from in the United States.

Truly, I think we younger fellows who keep our eyes open have a wonderful chance to learn much that we would ordinarily miss because of lack of funds for such extensive travel.

PVT. F. H. LOOMIS (USA)

* Major Malcolm R. Chandler (USMCR) wrote a letter which appeared under the caption "Is Travel Broadening?" on page 8 of the July PENCIL POINTS.

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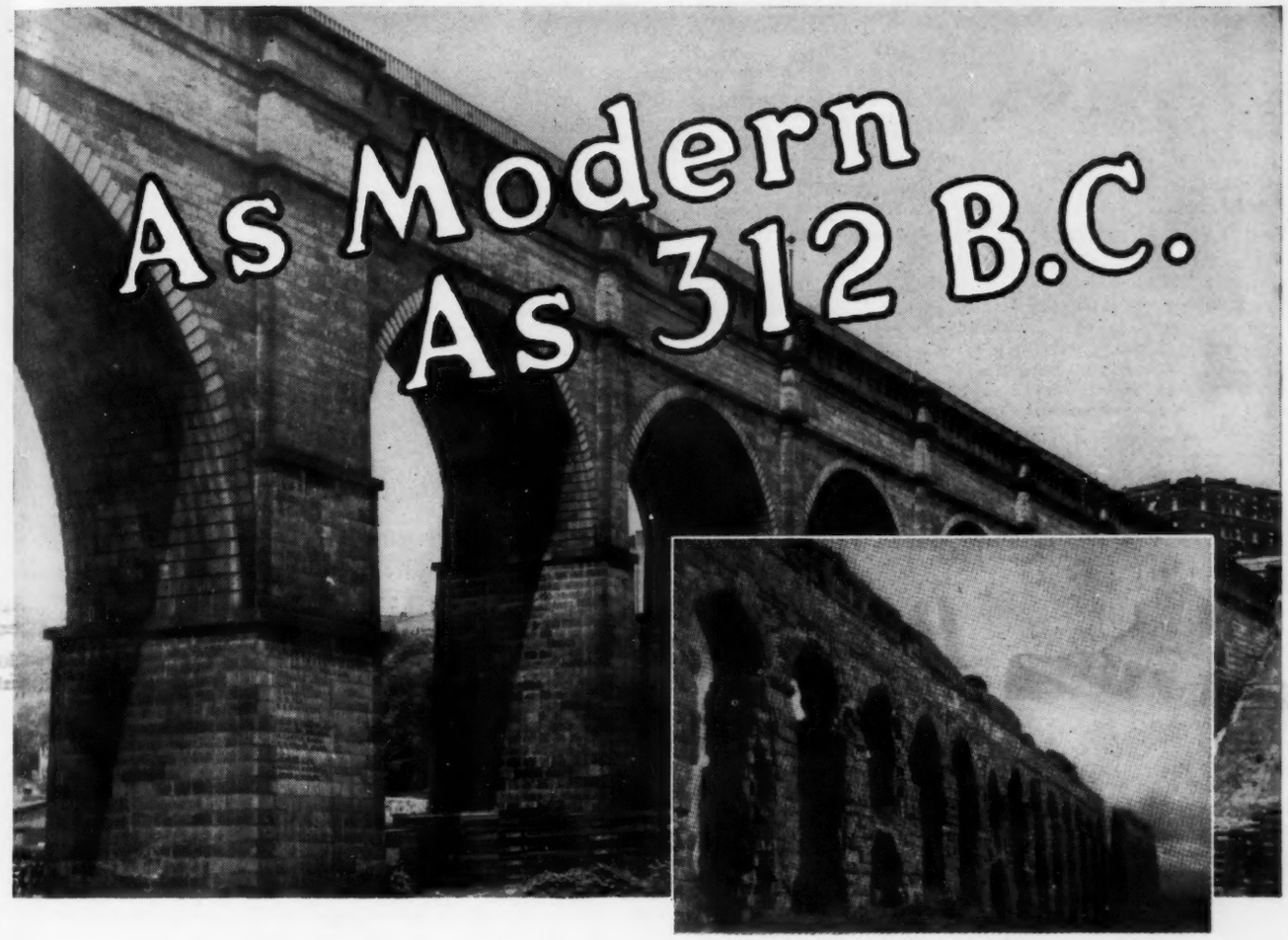


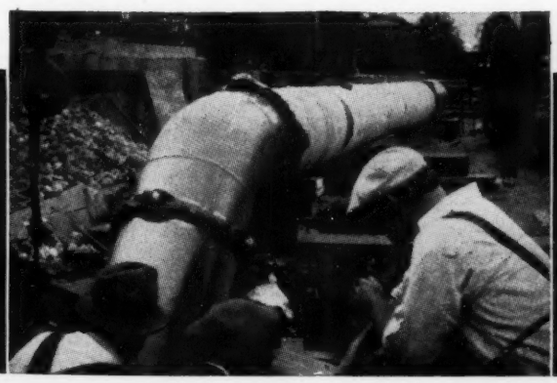
THIS huge pile of masonry is part of the Old Croton Aqueduct, delivering daily twenty-four million gallons of water to New York City. Old Croton is solid brickwork, concrete, and cast iron, 41 miles long, completed in 1848 after 11 years of work at a cost of $11,500,000.

Old Croton is only a hundred years old, but it might just as well be 2,256 years old, for it copies the principles and design of the even more famous Claudian Aqueduct of 312 B.C. whose ruins our boys see at Rome.

The modern way to provide cities with a permanent water supply is by means of steel pipe. Through one 24-inch steel pipe, for example--could be pumped as much water as this old aqueduct carries.*

Old Croton and the Claudian Aqueduct remind us that Steel, in its many versatile applications, has made America "modern" —also that Steel has a tremendous job still to do. Now dealing death and destruction to the enemies of civilization, Steel will have the task of helping restore world peace and prosperity. This basic metal, of which Youngstown is a leading manufacturer, will help make the post-war world a far better place in which to live.

**Figured according to Hazen - Williams "C" values.*



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Views

(Continued from page 10)

THE ARCHITECT—POSTWAR—POST EVERYBODY (Concluded)

In the first part of this article, Mr. R. M. Schlinder *began his analysis of the architect's relative position among those who contribute to building construction, (1) the landscape architect, (2) the interior decorator, (3) the tradesman, (4) the general contractor, and (5) the loan agency.*

Present interest charges are about five percent plus fees. By the time the owner has paid off his debt, he has paid more than *twice* the amount of the loan. This final doubling of the cost of the house reduces into insignificance the brain-twisting schemes by which the architect tries to save a few dollars through structural short-cuts. Government bonds pay two percent. Why should insured mortgages cost more? And note here, that the FHA accepts in its valuations the usual profits of contractors and tradesmen (up to 15% of the contract), but refuses to allow more than four percent for architectural services despite the higher minimum rates published by the A.I.A.

6. The realtor: We need not dwell on the subdivider. His lack of social responsibility, coupled with his fantastic profits have started the current cry for scientific planning. But even the simple salesman who gets your signature on the lot sales contract adds another five percent commission to the cost of your home.

7. And finally . . . the architect: We have reached the man whose performance determines whether the whole undertaking will succeed or fail—financially, structurally, and spiritually. He must know all materials and techniques and choose among them wisely. He must understand the owner and the neighborhood sufficiently to make his design an asset to both. He must sense the meaning of life and have a vision of its future. His imagination must enable him to take a pile of building materials and create an organism which will function and live.

His plans must cover every detail, must cope with the increasing complication of our mechanical development, and convey all necessary instructions to a host of skilled and unskilled workmen. He must supervise their performance and be responsible for the outcome.

The A.I.A. says that this contribution is worth a maximum of ten percent of the cost of the building—if the architect can get it. And hold on!—this charge is not profit, but must cover the architect's livelihood, the expense of his office, and the amortization of his education, consisting of at least five years of college and five to ten years of apprenticeship. Where is the architect's profit?

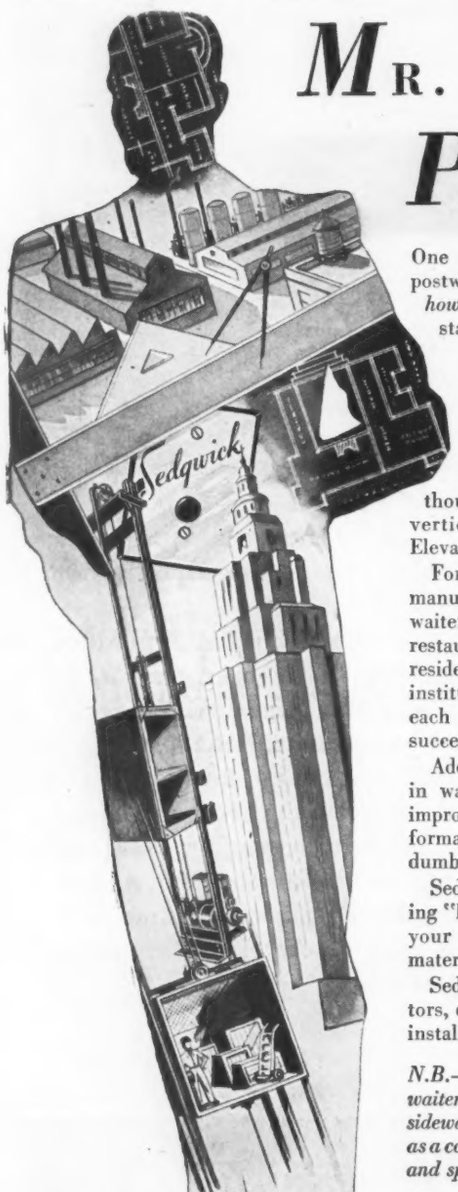
Is it any wonder then, that one architectural firm confesses that all jobs under twenty thousand dollars wind up in the red and serve only to maintain connections? That less scrupulous practitioners try to make ends meet by copying precedent instead of solving problems, by asking tradesmen to work out details (for which the owner therefore pays twice), and even by accepting secret commissions from contractors?

The A.I.A. further analyzes the value of the architect's various services: "supervision" of construction (which is largely delegated to employes) is valued at two-fifths of his total fee; "working plans" (again largely executed in the drafting-room) another two-fifths, and "preliminary plans" trail at the valuation of one-fifth of his remuneration. Here is final proof that the lack of public appreciation for the architect's work is exceeded only by his own self-abasement.

The "preliminary plans" are the very crux of the architect's contribution. They embody the over-all conception of the building and represent a complete synthesis of the architect's gifts, schooling, and experience. They should be the result of minute and lengthy studies of functional, structural, financial, and cultural problems entailed by the human needs and physical and financial limitations involved in the building.

It is for this main creative effort that

(Continued on page 14)



MR. ARCHITECT
POSTWAR STYLE

One of the most perplexing problems facing postwar-planning architects and engineers is *how to reduce costs*—and still maintain high standards of operating efficiency.

Reduced costs come from little economies piled one upon another. From the best use of materials and the use of the best materials—from efficiency of design and execution.

As one of the big, little economies much thought should be given to problems of proper vertical transportation. Consider Sedgwick Elevators and Dumb Waiters, for example.

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Added to past experience, the lessons learned in wartime manufacturing will take form in improvements in design, construction and performance of Sedgwick's postwar elevators and dumb waiters.

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"And the locusts went up over the land and rested in all the coasts * *; very grievous were they; before them there were no such locusts as they * *."

EXODUS 10;14

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Views

(Continued from page 12)

the architect earns the smallest portion of his fee.

A further paragraph in the A.I.A. contract allots the architect an additional four percent of the cost if the building is executed without a general contractor, on a "subdivided contract" basis. Why four percent? No self-respecting contractor will undertake to execute a building on this basis for less than ten percent.

The architect must realize the importance of his contribution and demand sufficient payment to permit proper performance. However, building is already overburdened with the charges listed above, and must be relieved. It is senseless for a family to spend years saving for the "down payment" and then occupy "their" shelter burdened with twenty years of debt bondage.

The only solution, both for the owner's over-indebtedness and for the architect's under-compensation, is for the architect to take charge of all building processes himself. His designs should include interiors and landscapes, to be executed by experts and subcontractors working under the architect's guidance. (In the planning of "contemporary" buildings, this procedure is a necessity.)

Complete management of building operations will not add much to the architect's tasks if he is in the habit of supervising properly, and need increase the percentage rate of his fee only slightly. It will bring him into closer contact with craftsmen and give him greater knowledge and control of costs. I have found it advisable to compute material schedules for all sub-contracts separately. This eliminates the slipshod and "come-on" bid, and protects the owner against eventual litigation. Coupled with a little extra care in certifying payments, it makes expensive bonds unnecessary. The owner has insight into the use of his money, and the element of uncertainty and distrust (justified or not) which the general contract creates, is eliminated. The increasing complication of our building processes allows so many variations from any norm that the lump sum contract becomes more and more a gamble —in which the owner can lose but never win, since an excessive estimate will not bring him a refund, though a low estimate can lead to claims for "extras," poor and halting execution, and even a summons to court. The general contract makes "building" synonymous with "trouble" and induces the buying of ready-made speculative buildings which do not satisfy individual needs. Building a house should be a major and stimulating event to the prospective owner.

I think this proposed simplified procedure will lower costs by concentrating charges and responsibilities, and at the same time still allow proper recompense for a key person.

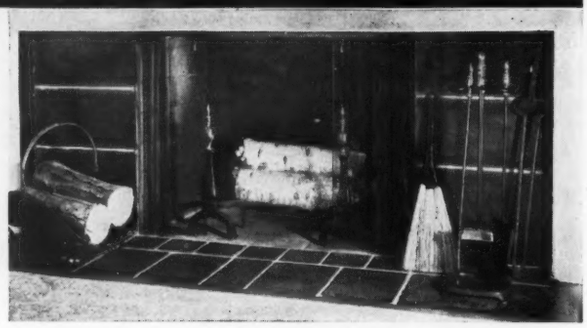
It is further important that subdividing be taken out of the speculator's hands and be guided by considerations of social need and of sound economics. The architect's vision for future living conditions can be a definite force for improving this field.

A lowering of costs and a concentration of rewards will enable the architect to enter the small house field—which he must do if we are to develop an architecture representative of a national culture.

Should the architect fail to regain a leading position as a builder, his outlook is dismal: the public will pay any amount for services of a commercial nature, but is unwilling to recognize cultural contributions. Similarly, war housing operations show that the government prefers to deal with large businesses and contractors who give the appearance of financial responsibility. It seems certain that the speculative builder and large manufacturer will become increasingly more powerful economically, and the bureaucrat more so politically. If he does not take steps to prevent it, *the architect will end up as their hireling, and his art will suffocate under a blanket of commercialism.*

(VIEWS *continued on page 16)*

Bennett "Fresh-Aire" Fireplace Unit



EVERY minute, as its fire burns, a fireplace exhausts an average of more than 200 cu. ft. of air from a house. Then what happens?

CASE 1.
Suppose construction is tight. Not enough replacement air can enter from outdoors. Result, with an *ordinary* fireplace: partial vacuum, downdraft, SMOKE!

CASE 2.
Suppose construction *does* allow replacement air to come in through small openings. Result, with an *ordinary* fireplace: chilling drafts, uneven temperatures, interference with temperature controls.

In *either* CASE 1 or CASE 2, the Bennett *Fresh-Aire* Unit *supplies* replacement air at the right temperature. Here's how. Bennett *Fresh-Aire* Unit draws replacement air from outdoors, heats the air in special chambers and distributes it, *comfortably warm,* to living quarters.

You can depend on Bennett *Fresh-Aire* Unit because it is *engineered* not to chill and *guaranteed* not to smoke.

Refer to Bennett pages in Sweet's, or send for our free catalog..so that you may meet the ever-increasing demand for the efficient, smokeless fireplace.

When you are ready to build, we will be ready to deliver.

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BENNETT
Fresh-Aire
FIREPLACES

For Door Specifications

New Factri-Fit Features Mean a Better Building Job for Your Client

Now Available Only for Essential Building, Douglas Fir Doors Will Be Ready Again When War Needs Lessen.

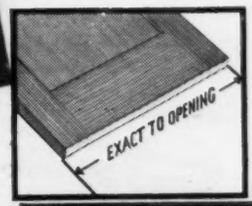
When you specify Douglas Fir Interior Doors "FACTRI-FIT," your client receives several distinct advantages. Because these fine doors are pre-fit, time and labor costs are reduced and construction speeded. The danger of misfitting and the possibility of a door being scarred by on-the-job cutting are largely eliminated. And the fact that Douglas Fir Doors are offered in basic, all-purpose, 3-panel designs assures your client a door that is beautiful as well as durable. For these basic designs are adaptable to all types of building and are in line with modern architectural trends.

In your post-war planning, make full use of the advantages offered by these new FACTRI-FIT Douglas Fir Interior Doors.

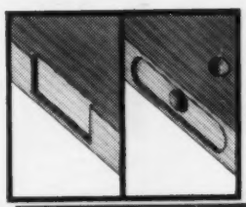
FACTRI-FIT

PRECISION-BUILT DOUGLAS FIR DOORS

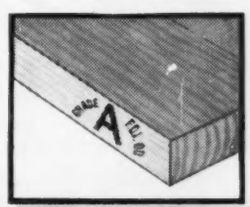
Stock Douglas Fir Interior Doors are now available with these precision features. Savings on the job more than offset the slight additional cost.



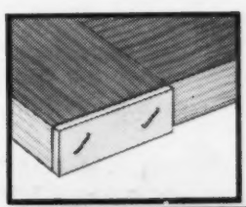
1 FACTRI-FIT doors are pre-fit at the mill, trimmed to exact size, ready to hang without sawing or fitting.



2 FACTRI-FIT doors may be ordered completely machined at your option—gained, bored or mortised by high-speed precision tools.



3 FACTRI-FIT doors (like all Douglas Fir Doors) are edge grade-marked for ease in ordering, specifying and supplying.



4 FACTRI-FIT doors are scuff-stripped to protect the precision-cut corners during handling and shipping.

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WRITE FOR CATALOG SHOWING THE COMPLETE LINE OF DOUGLAS FIR INTERIOR DOORS, TRU-FIT ENTRANCE DOORS, AND NEW SPECIALTY ITEMS.

Views

(Continued from page 14)

From a Landscape Architect

Dear Editor:

The October PENCIL POINTS arrived yesterday and was read promptly and as promptly raised the blood pressure of yours truly and this office to record heights.

Your featured "Views" writer, R. M. Schindler, makes a libelous statement about the landscape architect in saying that, after charging a commission of 15% on the total cost of the job, he "in addition collects a commission of about 20% from the nursery providing the stock."

PENCIL POINTS and its readers should be informed that no reputable landscape architect accepts or would think of accepting a commission or kick-back from a nursery or from any contractor, subcontractor, or material firm carrying out landscape plans or supplying landscape or building material.

This categorical statement of Mr. Schindler's may do great harm to landscape architects and their profession. PENCIL POINTS should promptly and publicly disclaim this false and misleading statement. It might also inform its "Views" writer that he should not generalize about the landscape profession from his own apparently limited experience with landscape work.

It is unfortunate that the letter from this Schindler is not published in full in this issue of PENCIL POINTS, for the first installment reads as though he were trying to build up an argument for the architect to grab a little extra emolument from his job somewhere along the line. In any event and regardless of what Mr. Schindler is driving at, he has made, by indirection, an unwarranted attack on the landscape architect, and I trust you will do what you can to correct this unfortunate statement.

WILLIAM E. HARRIES, Landscape Arch.
Buffalo, N. Y.

Editors' Note:

Mr. Schindler undoubtedly has used words loosely in referring to many people and activities concerned with architecture. The editors do not agree with him. That does not prevent us from publishing his article. These columns are open to those who have something interesting to say, and the resulting discussions can help to clear up misapprehensions. It seems to us better for all concerned that controversial opinions be brought out into the open rather than allowed to exist below the surface, unrecognized and unchallenged.

Living War Memorials

Dear Editor:

Thank you very much for the editorial which you sent us in response to our inquiry on war memorials. The sentiment expressed in this editorial confirms again the opinion we have expressed concerning need for "living war memorials," and it just adds to the weight of evidence that we already had on hand.

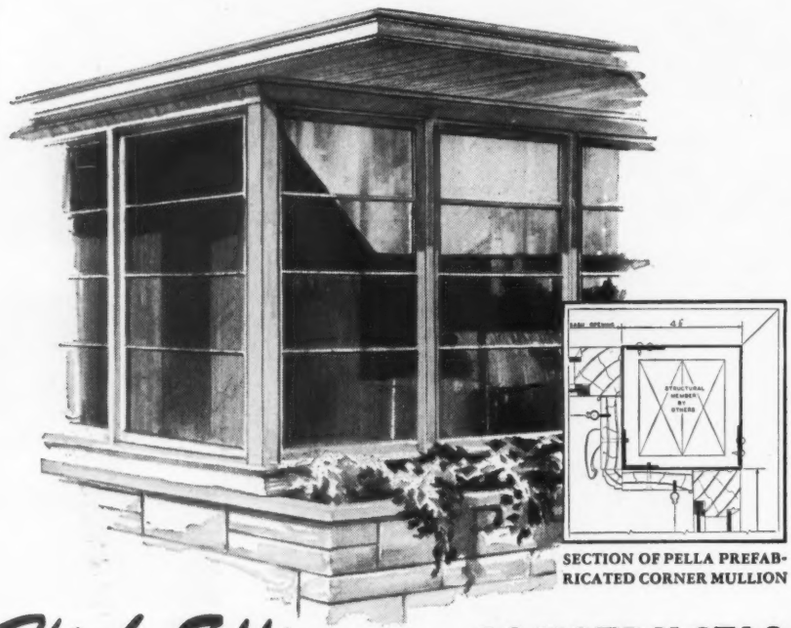
You will be interested to know that we had a very successful meeting, attended by about seventy-five citizens representing various patriotic organizations from all over the city. There was general expression of sentiment in favor of a community-wide memorial which would be of the "living" type.

H. W. STARICK
City Plan Board, Dayton, O.

CORRECTION

Professor Charles W. Killam of the Harvard University School of Architecture, whose letter on "The Seven Myths of Housing" by Nathan Strauss was published in the September VIEWS, pointed out that the third paragraph (Page 8) should have read:

We should not accept without question the repeated statements in the "Seven Myths" which give the impression that the slums are owned by powerful and well financed groups who opposed subsidized housing so as to protect their exhorbitant profits. The word *opposed* was omitted from the original letter.



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Pella's prefabricated stock size units have created this attractive corner window grouping. Pella's rigid rust-proofed steel frame fits neatly with the small *prefabricated* Pella corner mullion. It is window efficiency plus time saving construction. Windows of tomorrow demand larger light areas, increased efficiency and advanced design. Pella stock size units are right in step with a wide selection of sizes and light arrangements.

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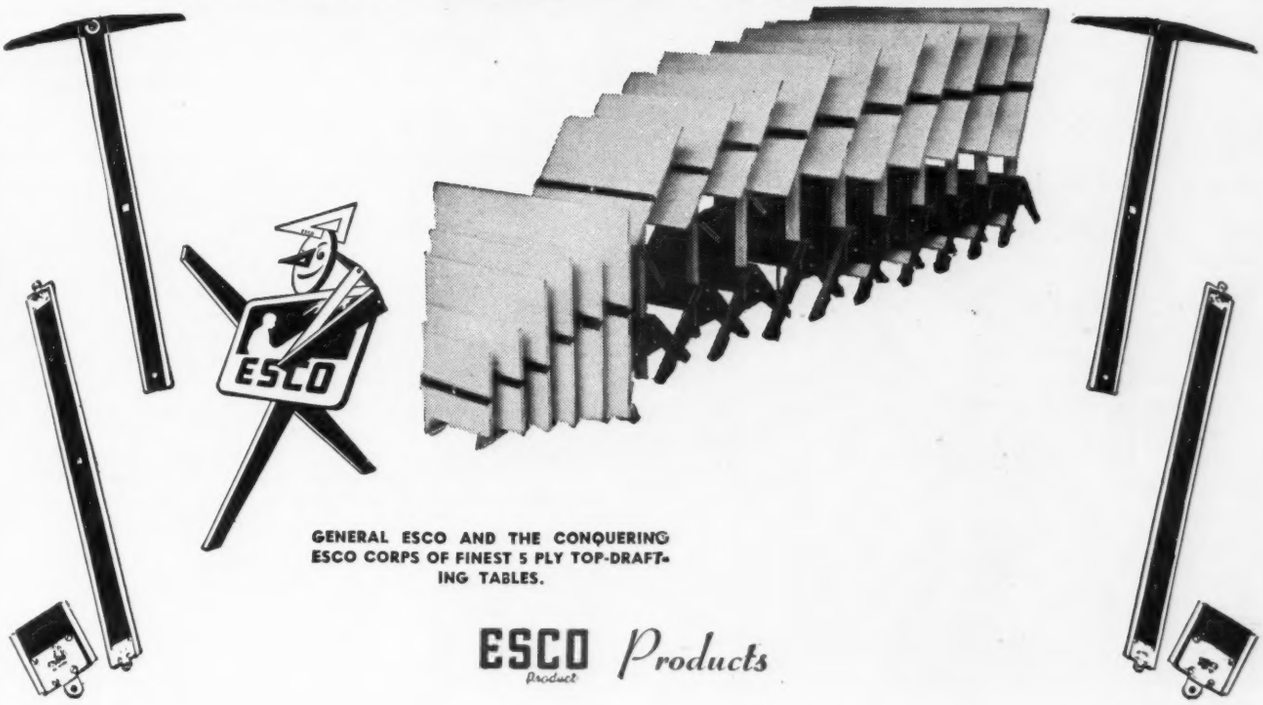
for Architects Navigators Engineers Draftsmen Artists

and the **SCHOOLS OF THE NATION**



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JOBS AND MEN . . . . . .

Postwar Employment Service

The soft drink industry wants architects and has schemes afoot to construct 2,000 new plants as soon as war conditions will permit. The American Bottlers of Carbonated Beverages says the industry is on the lookout for architects to prepare the plans. A recent industry survey indicated that many of the postwar planners have purchased suitable sites, while orders have been placed for much of the major machinery. Mr. John J. Riley, secretary of the association, states: "Many members who have told us of their postwar plans have also requested that we send them names of architects familiar with beverage plant design and engineering. To supplement our present list of architects, we will welcome correspondence from those interested in contacting prospective builders of soft drink plants. Write to the American Bottlers of Carbonated Beverages, 1128 - 16th Street, N. W., Washington, D. C."

200 professional and sub-professional *civilian* architectural and engineering personnel are wanted by the Army to complete, in time for increasing Pacific war activities, additional facilities vitally necessary in Alaska and the Aleutians. The call comes from Colonel "X," Engineers Corps, A.U.S. (who, although we can't give his name, is A.I.A. South Texas). Required personnel are in regular Civil Service grades P4, P3, and P2, and SP8 to SP4, inclusive; contracts will be for one year at regular rates of pay for grade, plus 25%, plus overtime, travel paid from and to point of hire; personnel will pay own rent and subsistence. Applicants may apply to any local U. S. Employment Service Office, or write direct to Base Echelon, Alaska Department, U. S. Army, Seattle, Washington; or write (air mail) or wire D. K. Este Fisher, Jr., Washington Representative, A.I.A.

An architect is wanted, to join a commission to Yugoslavia to rehabilitate and build industrial buildings, states *The Blue Print* of Westchester County (N. Y.) A.I.A. For details write O. J. Gette, president, Westchester County Society of Architects, 9 South 1st Avenue, Mount Vernon, N. Y.

Barcol OVERdoor

Up-to-date farmers are using Barcol OVERdoors, especially on new buildings like the modern, efficient hog house shown above. It used to be that hogs were raised in squalor; now they are given clean, tight, warm buildings and good yards, for one reason — it makes for better hogs. This hog house has a Barcol OVERdoor at each end so the trucks can drive straight through. Barcol OVERdoors are quality built, rattleproof, weathertight, easy working, long lived — exactly the kind of door intelligent farmers will use. Architects and builders — specify Barcol OVERdoors for farm buildings!

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Electric Door Operators

FACTORY-TRAINED SALES and SERVICE REPRESENTATIVES IN PRINCIPAL CITIES

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MEN WANTED

ARCHITECTURAL DRAFTSMEN, ALSO DESIGNERS, AND STRUCTURAL AND MECHANICAL ENGINEERS wanted for University of Illinois extensive postwar building program. If qualified, write to Ernest L. Stouffer, A.I.A., University Architect, 256 Administration Building, Urbana, Ill.

ADVERTISING SALESMAN: Permanent job for ambitious, imaginative beginner who wants advertising career, is willing start $60 per week. Top-flight publisher building paper requires N. Y. vicinity residence and travel New England. Architectural or sales background necessary. Future unlimited. Tell all. Box 112, PENCIL POINTS.

ARCHITECTS for permanent connection with progressive midwestern engineering office established over 20 years. Excellent opportunity. W.M.C. rules apply. Give complete background and salary required. Box 113, PENCIL POINTS.

TOPGRADE DESIGNERS AND DETAILERS WANTED. Office doing modern work—New York City. Box 110, PENCIL POINTS.

SITUATION WANTED

ARCHITECTURAL DRAFTSMAN, 6 years' varied experience, registered in Connecticut, desires position with small, progressive office in Connecticut or adjoining state. Now available. Box 108, PENCIL POINTS.

OPPORTUNITIES

ASSOCIATION WITH ACTIVE ARCHITECTS interested postwar expansion, integration, wanted by 2 Civ. Eng. (N. Y. Lic.), competent designers and executives with experience steel, concrete structures, bridges, housing, city planning. Out-of-town firms considered. Funds available. Box 109, PENCIL POINTS.

ARCHITECTURAL DESIGNER, gentile American, with extensive diversified experience and excellent contacts, wishes to sub-let space in New York City architect's office. Will assist architect if and when desired, and engage architect as consultant on large work. Box 111, PENCIL POINTS.

CHARLES MAGRUDER IS BACK WITH PENCIL POINTS

Were it not for wartime rationing, PENCIL POINTS this month would have killed the fatted calf. The reason? Charles Magruder, managing editor for the magazine from 1939 to 1942, returned from the wars and once again pulled up his chair alongside our editorial table. We need hardly tell you how agreeable this is to us; for in addition to being an old staff member, his training and experience form an impeccable background against which to follow and interpret the course of progressive architecture.

That he returned to the magazine is as logical as it is welcome; that he came here in the first place is also understandable, when you know the whole story. He'd pursued the Muse ever since high school days in Florida. During a summer vacation, Charlie, as tall and spare as he is now, worked in the Tampa offices of F. J. Kennard & Son, Architects and Engineers.

All unawares, he walked into a hornet's nest of architecture gone berserk; for his employment coincided with the burgeoning Florida Boom when "architecture" chose the sky as its only limit. There, as he says, the daily-expanding office staff afforded a "good cross-section of the architectural profession of the time, as designers and draftsmen arrived from New England, the Atlantic States, and the Midwest, each insistent that the particular 'period' or 'style' he knew best was the ideal solution for the palmetto-and-white-sand setting."

To any sensitive mind, it was essential to plow through the vanities of styles to winnow out what was basically important from what was just so much eyewash. Luckily, Charlie could never accept the compromises offered by the then-fashionable scenery assemblers who chose the noncommittal designation "Mediterranean" for the resulting hodgepodge.

In fact, his enthusiasm for honest architecture was whetted rather than dampened by the experience, and after a year as a junior draftsman, he went on to Rollins College to make friends with the liberal arts. Thence his pursuit of the ideal led him to the University of Florida. Here, Rudolph Weaver had just begun a School of Architecture which was interested in experimenting with teaching methods and theories then being entertained by a number of the more progressive architects both here and abroad. Charlie's own desire to reach down to fundamentals and cut through the mumbo-jumbo of architectural academism was richly nourished. In retrospect, he notes that at the time this type of objective exploration was ignored by most established architectural schools—ignored, that is, until the depression years later acted as a tack in the seats of the academic mighty.

A certain reaction was bound to set in from this heady kind of straightforward schooling. Charlie got more than his share of the pendulum swing; for on graduation from the school in 1931, he went out to the big, wide world at just the moment when economic ills made it small and narrow. These depression ills were no less malignant in architects' offices than elsewhere; spirits were low; funds were lower.

In the face of this situation, familiar enough to contemporaries, he made a typically sensible decision: he entered journalism. At the time, he admits, it was something of a desperate move for him to go to work in a newspaper office. But, although he "reluctantly absorbed some knowledge of writing and editing," he absorbed it so well that it tipped the scales later on in favor of journalism. There came a time when, Benchley-like, Charlie found himself in a quandary—in his case, happily, not for ten years. The moment came when the decision had to be made whether to continue in journalism or to return to architecture "starting again at the bottom as a junior draftsman."

A compromise, suggested by the Florida architect, Franklin O. Adams, proposed architectural publishing as a likely field; and, as chance would have it, PENCIL POINTS at the same moment was looking for Charles Magruder. The result: the 1939-1942 tenure with the magazine as managing editor.

During the tenure, incidentally, the magazine began its now well known metamorphosis from the old PENCIL POINTS to the magazine of progressive architecture. Charlie Magruder deserves no small part of the credit for the success of this significant change.

World War II then came along to upset normal plans for almost everybody, Charlie included. He departed from PENCIL POINTS to serve the Army as pictorial editor and consultant on printing production for the Department of Training Publications, the Engineer School, Fort Belvoir, Virginia.

The Army offices in Washington were interested in modernizing the training literature of various branches, and it was possible to initiate publication of manuals that broke with the rigid traditions of Army style. Those familiar with the Army's series of camouflage manuals know the publishing knowledge and creative work that went into them.

Charlie modestly forbears to say how much his own drive and initiative contributed to the work. Knowing him, we suspect they were very important factors. At any rate, during his two years' work as supervisor of the production of two series of the camouflage manuals, they were the first for the Engineers to be appropriately printed in full color. In addition, he collaborated in the production of a manual for the relatively new Aviation Engineers, which introduced the use of aerial kodachromes of actual wartime installations as AE training aids.

Upon completion of these important manuals, which set new standards for official training literature, Charlie was free to return to assist us here. With his invaluable help, it is our hope that in the months to come PENCIL POINTS will itself set new high standards. We welcome his return more than these few paragraphs can possibly indicate.

News

Design and construction

Developments afield

Building Regulations

Related Professions

Products Progress

Maybe New York City can't have a logical and comprehensive plan, but at least one city father seems willing to approach the subject by the devious political route. Controller Joseph D. McGoldrick proposes that the city buy up, regenerate, and auction off 8 blighted Brooklyn blocks. The area affected is small, but now a responsible official has advanced a scheme which, though limited in scope, has the earmarks of a feasible plan.

In a letter to the City Planning Commission, McGoldrick called his idea "practical both legally and economically" and said the provision of $50 million worth of public buildings, highways, rezoning, etc. (now budgeted for 1945), would not of itself bring about property improvement in the decayed portions of that region. His plan is to have the city acquire these extensive tracts, replan the street system, rezone, and then offer sizable building plots for sale at public auction.

He states that if his idea is incorporated with other area improvements planned, the city would entirely recover its outlay (McGoldrick estimate: $20 million) in acquiring the property and would secure a substantial enhancement in taxable values; that the area is one capable of sustaining moderate-priced apartments without tax subsidy; that a single block or portions of the larger ones could be offered separately to permit participation by groups of moderate financial strength whose interest and initiative in building "must be maintained." He finds authority for such transaction in the State Constitution, Article XVIII, Section 1, which gives the city the right to clear, replan, reconstruct, and rehabilitate substandard and insanitary areas. He stated he thought it "rash" to spend $50 million for other contemplated improvements without making every effort to initiate a regeneration of the whole area into "super-blocks."

News

"Packaged" airport equipment for use in foreign countries may now be purchased from a catalog.

Westinghouse Electric International Co. announces that they are prepared to deliver (even by air) airport equipment and facilities, including prefabricated buildings, and that they can equip any nation with a whole system of feeder airports of any reasonable size or specification. These packaged designs are said to be complete from 2-gram gasket to 6,000-lb. Diesel generator. Four examples of packaged assemblies:

Airport A—smallest, designed to reduce costs and services to minimum but to include essential elements: radio transmitter, 50-kilowatt generating system with 100% standby, minimum of lighting to permit safe night landings (boundary lights), gasoline dispensing system, simple terminal building, hangar, power house—for a port without paved runway.

Airport B—larger, designed primarily for air freight operations; based on existence of a 3,000-ft. runway; materials for larger or smaller runways can be added or subtracted.

Airport C—still larger, a typical passenger and freight port capable of handling international traffic; maximum 6,500-ft. runways.

Airport D—largest, primarily a fueling and emergency repair airport for very large transport and military planes; equipped for heavy traffic; maximum 12,000-ft. runways.

Because flying is global, climate becomes a dominant factor; therefore equipment is engineered to three temperature classifications—arctic, temperate, and tropical. Correlation and reduction in number of basic elements are said to make it possible to assemble almost any desired airport through selection of basic units and to permit facilities of any given airport to grow if the need arises.

Packaged equipment ranges from electrical generating and distributing, public address system, to sewage disposal, and from hangars to guest houses. The company does not grade fields, build runways, nor make installations, but will cooperate.

A new airport plan for Pittsburgh has been approved by the Civil Aeronautics Authority in Washington.

While the master plan is not to be carried out until after the war, the actual building designs are to be started immediately, and the Army has already installed field and landing lights and begun grading for buildings to be used by the ferry command (to operate there this fall).

Features of the master plan: 3 dual runways, each 7,000 ft. long, and one 10,000-ft. runway for trans-oceanic flights; paved loading platform (horseshoe shaped) over a mile long, for simultaneous loading of 31 planes, with taxi strips for easy access; parking lot for 3,000 employees' cars, 2 additional lots for 6,500 visitors' cars; administration building for offices and concessions; 1,400-ft. curved observation deck around loading platform, overlooking the field; a private deck under this for plane passengers; space for commercial and private plane hangars, express and mail buildings, taxi strips, fire house, gas storage building, commercial garage, helicopter landings.

Driving-time to downtown Pittsburgh will be cut to 25 minutes by new, one-way high-speed roads. The airport committee consists of Allegheny County Works Director John B. Sweeney; Aviation Director Twing Brooks; Planning Engineer Park H. Martin.

Expropriation of District of Columbia slum property was proposed during 1944 as a legislative measure by Senator Arthur Capper, Republican, of Kansas.

At a hearing of a sub-committee of the Committee on the District of Columbia, he said: "I have reached the conclusion that these alley slum properties are here because they pay a better rent on the money invested than most any other property or investment in this city . . . Well, can these alley properties not be declared a nuisance, a public nuisance, and cleaned out . . . ?" It is said legislation such as this has long been in force in England and is largely responsible for the progress made by the British slum clearance program prior to the war. At the same time the investment value of slum dwellings has been decreased by a growing supply of decent houses for low income families. The interested reader may find more light on this subject in the June 1944 issue of PENCIL POINTS.

F. Vaux Wilson, vice president of the Homasote Co., has his Homasote houses ready for mass production.

He is president of a new Homasote offshoot, "Precision-Built Homes Corporation," which has an authorized capitalization of $1 million, partly financed by contractors, dealers in building supplies, and "others" in the U. S. housing field. The new company will sell houses directly and will also license builders to set up fabricating plants. Cooperation with department and furniture stores is expected. Nothing was said in the announcement about obtaining really good design beyond the statement that the company would engage in research.

Recent easing of WPB restrictions on hardwoods and lower grades of lumber is expected to avert the shutdown of small mills, which were threatened by strict lumber control.

The small mills may now make sales on orders without priority rating or Government certificate. Lumber distributors may buy and sell on unrated and uncertified orders if the lumber originates in small mills, though such actions must not interfere with the filling of certified orders.

Magnesium is now free of all federal control, and conversion is to begin immediately. Production is now 300,000 tons annually with 8 government plants working.

Authorities told the magnesium industry that the postwar market, excluding new products, is about 9,000 tons annually. The third most plentiful element in the earth's crust, magnesium has one-fourth the weight of steel. It was predicted, because of its light weight, as the inevitable material for anything that must be movable, and in construction generally, wherever the combination of light weight and high strength is the paramount consideration.

According to the Aluminum Company of America, magnesium will be satisfactory for any structural purposes if used above the floor line, since it has a tendency to corrode in damp environments unless protected. It is expected to be usable for frames of mechanically-operated doors, opening mechanisms, ceiling braces, window guard rails, frame castings, etc. Technology of the use of magnesium is still in its infancy, however.

American Hospital Association has gone on record as approving government aid in hospital building and expansion programs.

At its Third War Conference, the statement was made that the American people have expressed a desire for increased hospital care, and that some sections of the nation, especially the rural parts, are without adequate hospital facilities. A two-year nation-wide survey of facilities is being conducted by the Association's Commission on Hospital Care, which expects its findings to aid in shaping postwar hospital development.

The recently formed Rutgers Farm Building Institute is now planning a worthy program toward improvement of farm structures.

It urges its members to "leave behind all preconceived notions about how a dairy barn or a machinery shed or a silo ought to be built . . . We ought to forget that any of us has ever seen a farm building, and project ourselves into the mind and body of the cow, the hen, the pig, and try out their specifications for the spatial, environmental, sanitary, and other factors that will promote the most efficient production of milk, eggs, and pork."

This is surrealism of the first water. We have visions of dignified members of the Institute desperately striving to take on the personality of a hen, to get a pig's-eye view on sanitation, or a cow's notions on stall maintenance.

Antioch College in Ohio is planning its campus.

Eero Saarinen, of Saarinen & Swanson, has been commissioned to make a long-range campus plan for location of new buildings and maximum use of its 850

acres. Saarinen, who believes planning is more than sitting down with a map and a T-square, has visited the College to discover the flavor of Antioch life and learn everything possible about the kind of people who will be using the new buildings.

The "tried-and-true" kitchen won out (62.6% to 36.9%) over the "day-after-tomorrow" kitchen in a recent contest conducted by McCALL'S MAGAZINE.

"Tried-and-true," according to McCall's, is no farmhouse kitchen with a pump and an iron sink; it's the familiar, though relatively new, combination of plan and up-to-date equipment organized around kitchen activities; "day-after-tomorrow" is a rather futuristic dream, not too well thought out. It was found that the "kitchen perception" of the average woman is far more knowing and more discriminating of design and function than her perception in the furniture field—which led the editors to comment: "Perhaps the kitchen really is the most important room in the house as so many of these women write, or perhaps more women have received more and sounder education on kitchens from an alert and active industry."

Over 4,000 of the 11,887 women who entered the contest plan to remodel their present kitchens, the main changes being built-in features and re-arrangement of major equipment. It was stated that the average woman has trouble in visualizing a remodeling job that involves changing walls, doors, and windows, and that expense is naturally a factor in this direction.

Other findings: Many women fail to recognize multiple doors in a kitchen as one of the chief trouble-makers; glass brick and tile walls were well received, but disapproval ran 5 to 1 on use of glass for cabinet and refrigerator doors; plans for new and larger windows brought a more enthusiastic response than plans for all other structural alterations; three-fourths of the women prefer a separate dining room; more than three-fourths want an eating space in the kitchen, also.

One of the largest building materials manufacturers has surveyed postwar building plans of more than 1,000 men and women.

Results: most families intend to spend from $4,000 to $10,000; half expect their homes to cost between $4,000 and $6,000; one-fourth expect to pay between $6,000 and $10,000; one in 6 hopes to pay less than $4,000; 1 in 20 plans to spend more than $10,000. Practicality, convenience, and ease of maintenance took precedence over style preference. For exterior surfacing, most people surveyed preferred wood in some form; other choices, in order, were brick veneer, solid brick, and stone. Interior preferences were for living room, dining room, kitchen, two or three bedrooms, and bath—all easy to clean and equipped with modern labor-saving devices; crack-proof walls and ceilings were of considerable importance; insulation was specified as a "must" by all. The majority planning to spend over $6,000 want a den or recreation room. More than a third favored a utility room instead of a basement.

The 21st semi-annual meeting of the Producers' Council, Inc., will be held from November 27 to 29 at the Hotel Roosevelt, New York City.

Among others, sessions will be held on "Forecast of 1945 Construction and Analyses of Residential, Industrial, and Farm Postwar Construction Markets," "Adoption of Residential Financing Program," "Manufacturers' Policy on Housing Research Bill," "Report on 4-point Farm Buildings Program." The Council invites all manufacturers, trade associations, and the entire construction industry, trade press, and others, to attend the sessions.

A large exchange exhibition of paintings, watercolors, and sculpture by British artists has been shipped to this country for a year's tour.

The National Academy in Washington will show the collection until December 4. Among artists represented is Major Sir Muirhead Bone, whose architectural training has aided him in becoming a distinguished draughtsman, particularly of architectural and naval subjects; he is now Official Artist to the Admiralty. Other well known artists exhibiting are Augustus John, O.M.R.A.; W. Russell Flint, R.A.; A. R. Thomson, A.R.A.; Duncan Grant. The exhibition was arranged by the Central Institute of Art and shipped through the British Information Bureau and the Office of War Information.

Col. Henry O. Newton, F.A.I.A., special representative of the War Department's Commission on Monuments, Fine Arts, and Archives, recently completed a tour of that part of Italy now occupied by the Allies.

He reports that officers of this Commission in the 5th and 8th Armies have often worked under fire to carry out their work of salvaging art treasures. At the date of his report, nine deposits of Italian paintings and statuary had been recovered by the Allies in northern Italy. Fourteen deposits were in German hands, but their locations were known to the Allies, who are taking every precaution to prevent their destruction.

There will be no battle in England between private and public interests over who is to clear the slums and provide postwar dwellings for low-income families.

The statement comes from Miss Caroline Haslett, "No. 1" advisor to England's Ministry of Labor, who further said three postwar home-building programs are planned for Great Britain; on each program local housing authorities will be in charge but private builders are assured of their share. The first program is for prefabricated "Churchill homes" for returning soldiers, these homes to be offered at low rentals and to be destroyed within 10 years. The second is to be for substantial, permanent, rental houses for the very-low-income families. The third is for higher-priced construction to be sold to white-collar and professional workers. All three are to have government subsidy, it is reported.

News

N. V. Baranov, chief architect of the Leningrad Soviet and head of the City Planning Commission, reports that the Central Council of Architects has no intention of building skyscrapers, "houses of tomorrow," or even temporary housing units for people who lost their homes during the siege.

He stated Leningrad will have no temporary housing unless some unforeseen necessity for it arises, giving as the reason for this judgment that temporary housing tends to become permanent and he and his colleagues do not want to be guilty of erecting modern slums.

WAR MEMORIALS

Evansville, Indiana, has elected to honor its war dead with a million-dollar memorial airport and community center. Albert Kahn, Inc., Detroit architects-engineers, are completing preliminary plans.

George Marshall Martin, A.I.A., has been selected as Great Lakes District representative to the War Memorials Committee of the A.I.A. The committee is to select the most practical structure that can be chosen for a memorial and as a symbol of well-being and progress.

A brochure containing suggestions and illustrations of types of athletic buildings and facilities to be constructed as war memorials is being compiled by a committee of architects headed by Howard Dwight Smith, A.I.A., of Columbus, Ohio, designer of the Ohio State Stadium.

The three paragraphs above are not the only examples of this kind of activity. All the interest is not due, we are sure, solely to Kenneth Reid's editorial on living war memorials, which appeared in this magazine in May, 1944. That same month, *American City* spoke to the same purpose; later, the *Architectural Record* and *Forum* did their stuff. May the idea spread!

HOUSING NOTES

Several housing projects for Negroes, totaling about 2,000 dwelling units, were started in Chicago last year. About 90% of these units are for rent; rentals range from $42.50 to $55.00.

1,794 houses costing about $10,000 each are planned for postwar building on a 300-acre development tract just beyond Philadelphia's city line. The bulk of the site was bought from the Widener Estate.

News

Products Progress

Industrial Fluorescent Units

A new series of fluorescent industrial units is announced by Curtis Lighting, Inc., 6135 West 65th Street, Chicago 36, Illinois. They are two- and three-40-watt lamps for use in industrial plants, airplane hangars, and other industrial interiors. Units may be hung individually or in continuous lines for higher intensity by means of chain, conduit, or cable, and may be used over work benches, machines, etc., or for general lighting. Dimensions: 48" long, 12-9/16" wide; wired for 110-120 volts.

Engineers' Slide Rule

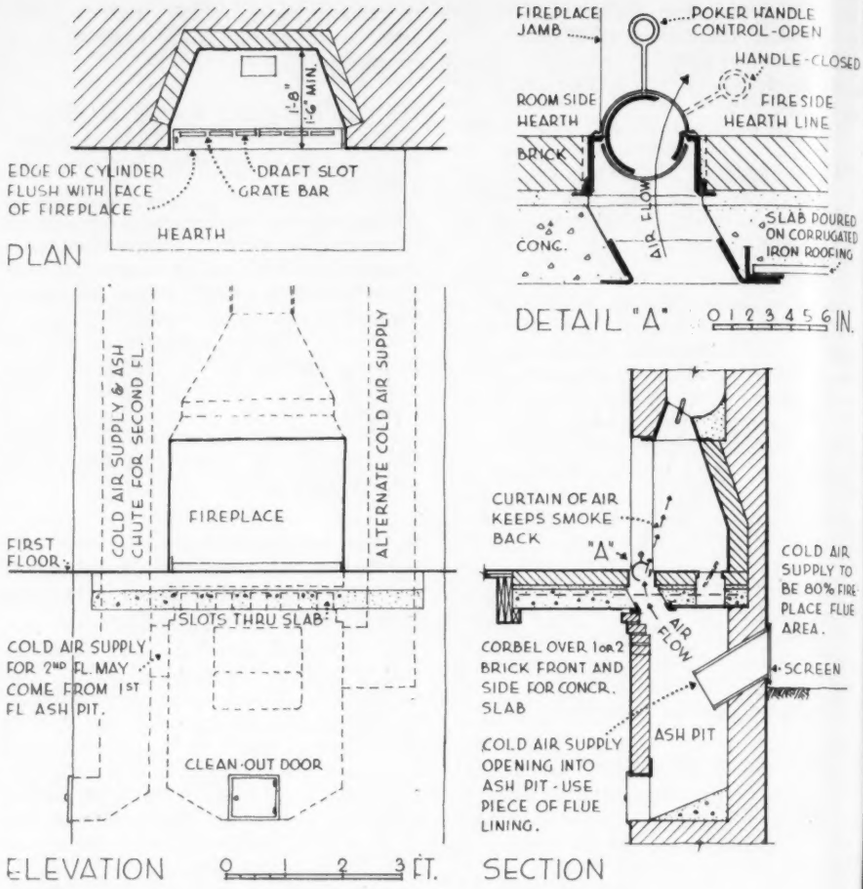
A new 5-inch pocket slide rule for engineers is manufactured by Charles Bruning Company, Inc., 102 Reade Street, New York City. A feature of the "Bruning 2401" is claimed to be the precision of its graduations, which are molded in as an integral part of the rule; they will not lose visibility through use. Graduations and numerals of the CI scale are in red; 3 screws in the back provide tension adjustment; glass indicator is enclosed in a stainless steel frame; A, B, CI, C, D, K, S, L, and T scales are given; beveled edges are in graduated scales of inches and of centimeters. Information on cost may be obtained from the company.

Pressed Laminated Plastics

Formica Insulation Company, Cincinnati, Ohio, announces a new development which may have wide postwar use. Heretofore it has been necessary to shape "Formica" by building molds; now it has been found that a cured sheet of the metal can be heated up to a temperature just under the blistering point and, if stamped quickly, may be formed to a shape which can be maintained. The press used has inexpensive wood or "Pregwood" dies.

All-Steel Industrial Fluorescent Units

New all-steel units (2-40 watt, 3-40 watt, and 2-100 watt) for industrial fluorescent fixtures are announced by Mitchell Manufacturing Company, 2525 Clybourn Ave., Chicago 14, Illinois. All are provided with "instant-latch" for releasing reflectors without the use of tools; have open or closed end reflectors; wireway channels and reflectors are of heavy gauge steel; outside finish, battleship gray. Accessories are said to provide for every method of mounting or hanging—individually or in continuous rows. All units are Underwriters' Laboratories and E.T.L. approved; power factor over 90%; stroboscopic corrected; 110-125 volt 60 cycle A.C. (available in higher voltages). Priority: AA-5 for new lighting projects; AA-2 under MRO.



Controllable Fireplace Draft

Draft-starved fireplaces may get a break with the new chimney draft designed by Carter Engineering Corporation of Warrenton, Va. The inventor, Randolph H. Carter, a building contractor, says he invented it because he often encountered trouble in the new "air-tight" homes—where fireplaces smoke unless a window or door is partly open. The new device admits air at the bottom of the fire and the normal chimney draft does the rest. This curtain of air is said to supply 80% of the necessary draft that is normally pulled into a room as cold air from outside. A poker-handle control is easily shifted to direct the air curtain up the chimney, keeping the smoke to the back.

The inventor claims for his baby the following features: it starts fires quickly with practically no kindling, the fire burning strongly from the start without fanning or blowing; if the fire dies down, it can be instantly brought back by directing the draft to the base of the fire; it controls fireplace heat—it is unnecessary to "burn that big log left smoking by itself"—the draft can just be shifted back on it; the concealed draft tube is a help in keeping the front hearth tidy; there is nothing to get out of order—dirt and ashes have no effect on the operation; there is nothing to wear out.

Coating Resin

"Duraplex AL-210" is a new drying-oil type resin developed by Resinous Products & Chemical Company, 222 W. Washington Square, Philadelphia, Pa. Designed for use in protective paints for structural steel, aluminum paints, red lead primers, shingle stain reinforcing, all industrial maintenance, etc., it is said to produce flexible coatings of good adhesion and wearing qualities; to be soluble in mineral spirits and other aliphatic hydrocarbons; to tolerate additions of cold cut resins, raw and bodied oils, and certain blending varnishes. Drier concentrations of 1.0-1.5% lead, 0.05% cobalt, and 0.03% manganese are recommended. The resin is said to be a good general purpose grinding medium for air-drying paints and enamels and, because it is said to contain only 50% reportable oil, it is now available without end use restrictions.

Plastic Screen Cloth

A new plastic insect screen cloth called "Lumite" is announced by Chicopee Manufacturing Corporation, 40 Worth Street, New York 13, N. Y., as a war-developed product which may spell obsolescence for old-fashioned window screening. Woven from a Dow plastic developed from brine and petroleum, it is said to have the tensile strength and durability of metal; to be flexible; to be rust-, flame-, and corrosion-proof, non-staining; to be about one-fifth the weight of metal; to be easily cut with ordinary household scissors, pulled

Pencil Points
PROGRESSIVE ARCHITECTURE

YOU Are Making The Future!

The shape of things to come after the war is at this moment somewhat obscure. No one knows surely just how the world after Victory will work out—economically, politically, socially, or any other way. There are too many uncertain factors. Yet people persist in speculating about tomorrow (perhaps because of this very uncertainty) and they reach various conclusions, each according to the way he wishes his tomorrow to be.

In general, the dreams fall into two categories. Timid men, shaken by these troubled days, picture a future modeled after some part of the past which they remember as most friendly and peaceful, and to which they want to return. Younger and bolder spirits envision a new and exciting era in which men, grown weary not only of wars but of poverty and disease and hardship, will finally work together with wisdom and science toward the goal of universal human welfare, abundance, and peace. Architects who understand and value and strive to exercise creative imagination, might be expected to side with the second group. Perhaps most of them do.

At any rate, architects do have, more than most, a chance to influence the future by helping to form at least the physical environment in which people will work and rest and enjoy themselves. Already they are laying out the houses and schools and hospitals and stores and workshops of tomorrow. Already they are helping to plan and replan the communities in which their fellow men will live. Soon their drafting rooms will expand with increasing work and builders will commence to put together in solid materials the things first visualized on paper. We will then be in full swing on the way to making the new world we have talked about so long.

What sort of architecture will we produce? Will it reflect predominantly the views of those who want to turn back the clock? Will it be a hodgepodge of exhibitionistic mediocrity such as we see about us today, if we look at it honestly? Or will it be a brave new architecture created in the belief that this era must be true to itself and take advantage of all the possibilities our industrial civilization has laid before us to serve the needs of the people?

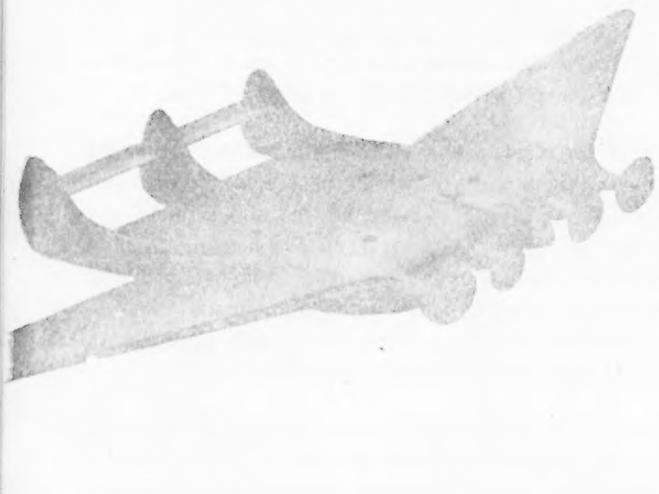
Our own sympathies, as stated again and again in this magazine since we took our positive stand for progressive architecture in May 1942, are with the forward-looking groups. We believe thoroughly in the vitality and honesty of their efforts to get rid of the superficial shell that had grown upon the practice of architecture during the age of eclecticism and to get back to the fundamental principles that have always guided good design. We have directed our editorial policy during the last two-and-a-half years to the encouragement of this return to basic thinking.

Apparently our change was in line with current trends, for our circulation has grown during this time until now we have more architects, more architectural draftsmen, and a larger total of professional men as paid subscribers than any magazine in the field. We welcome this endorsement as evidence that American architecture is moving toward a better, saner, and more honest type of design than we knew before.

This is, as Herbert Agar has said, "A Time for Greatness"—and will continue to be. And the greatness must be found in places of low as well as of high degree. Along with everyone else, the architect faces the challenge of the future. To meet it successfully, every architectural man must share the responsibility of building the better world. No job of his is so small that it cannot be directed to this end. Let us all resolve to write our part of the record of these next decades in such architecture as will take its place with the best in all history. It could be! Let's not have to say afterwards "It might have been!"

Kenneth Reid

AIR TERMINALS FOR MASS



Francis Meisch has probably had a better chance to study the design of airport structures "from the inside" than most American architects. In his capacity as Architect and Plant Engineer for Northwest Airlines, he has had many an occasion to develop schemes designed to indicate to municipalities along the airline's route what type and size of buildings his company needed; and he has spent much time on the problem of the air terminal building.

Photographs of the Burnelli Flying Wing, above, and the British "Miles X," appear through the courtesy of Skyways. *Most of the drawings in and following this article were prepared by Mr. Meisch; the remainder were redrawn from his originals.*

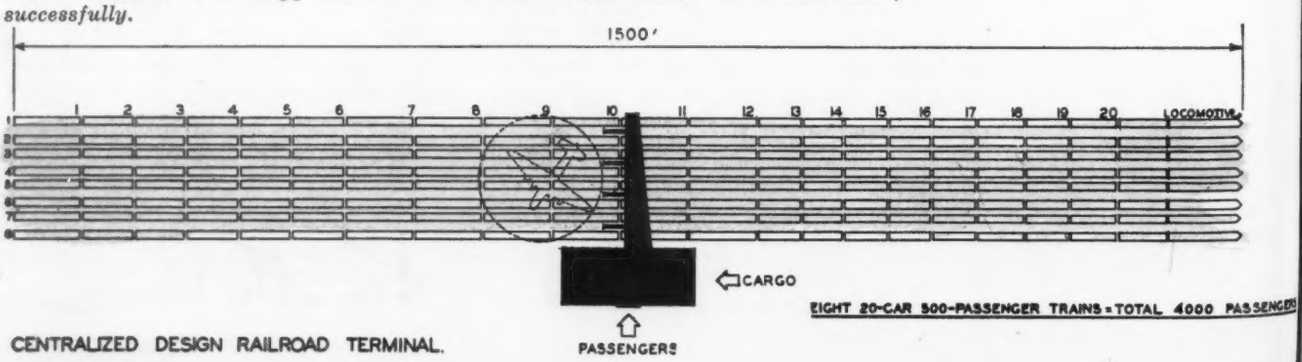
The Past

Up to now, airport administration buildings have been erected with little regard for function or changing conditions. The buildings were planned for smaller planes and plane loads than are now being handled or anticipated. Both administrative and terminal functions were combined within one structure, together with any number of related and unrelated minor activities. Too many of these functions, subject to expansion, were crowded into symmetrical structures built in too permanent a manner. The buildings were either low-cost structures which, through poor maintenance, soon deteriorated into veritable slums, or expensive municipal monuments, show places for the general public. The monumental stone or concrete edifices defied all attempts at economic remodeling or expansion to keep pace with the fast-growing air transport industry. Consequently, their useful life was terminated far ahead of their previously estimated economic life or amortization period.

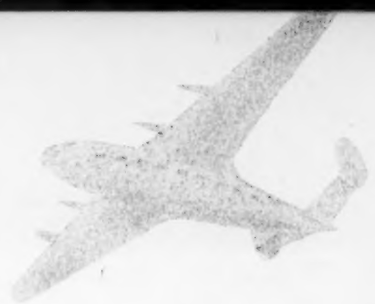
The buildings had other faults. Often there were too little space and too few facilities for the airline passenger and the airline operational functions, in contrast to public areas. In addition, little thought was given to developing service and revenue-producing facilities of a high standard for the convenience of passengers, the public, and employees. The result was that the airlines were expected to pay the lion's share of the operating costs of these monuments. The buildings themselves were often poorly placed in relation to apron and apron expansion, runways and proposed runways, access roads and drives, parking areas, and other fixed construction such as hangars. This placement, in most instances, excluded any possibility of expansion.

In many cases there was a lack of balance in the various types of traffic flow; consequently, bottlenecks developed. The various types of traffic flow—plane, passenger, cargo, general public, and automotive—are governed

The two drawings below compare, for a railroad and an airline terminal, the maximum number of passengers which each can serve from a centralized terminal building. The author believes the analogy between rail and air travel cannot be carried this far successfully.


1500'
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 LOCOMOTIVE
CARGO
EIGHT 20-CAR 500-PASSENGER TRAINS = TOTAL 4000 PASSENGERS
PASSENGERS

CENTRALIZED DESIGN RAILROAD TERMINAL.



AIR TRAVEL

by Francis R. Meisch

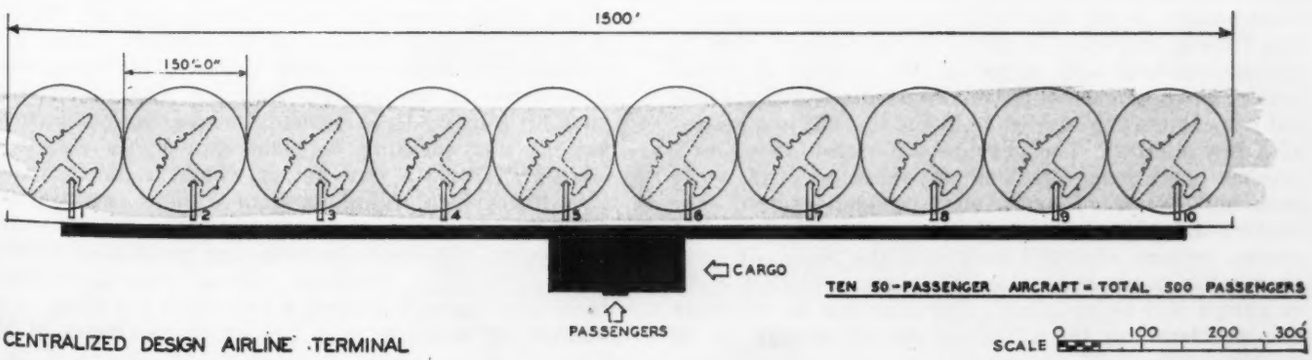
Architect and Plant Engineer, Northwest Airlines

by many factors. These factors, in the main, are air traffic circle capacity, runway configuration capacity, taxi-way pattern capacity, apron or gate capacity, terminal building capacity (for adequate handling of passengers, baggage, air cargo, the general public, and spectators), parking lot capacity, capacity of access drives and roads, and capacity of the highway between the airport and the city for volume or high-speed traffic. In terminal design, the building, the apron, the parking lot, and the access drives are of primary concern. The other considerations fall into the realm of airport planning or city planning. Balancing all the factors to provide uniform traffic flow is very essential.

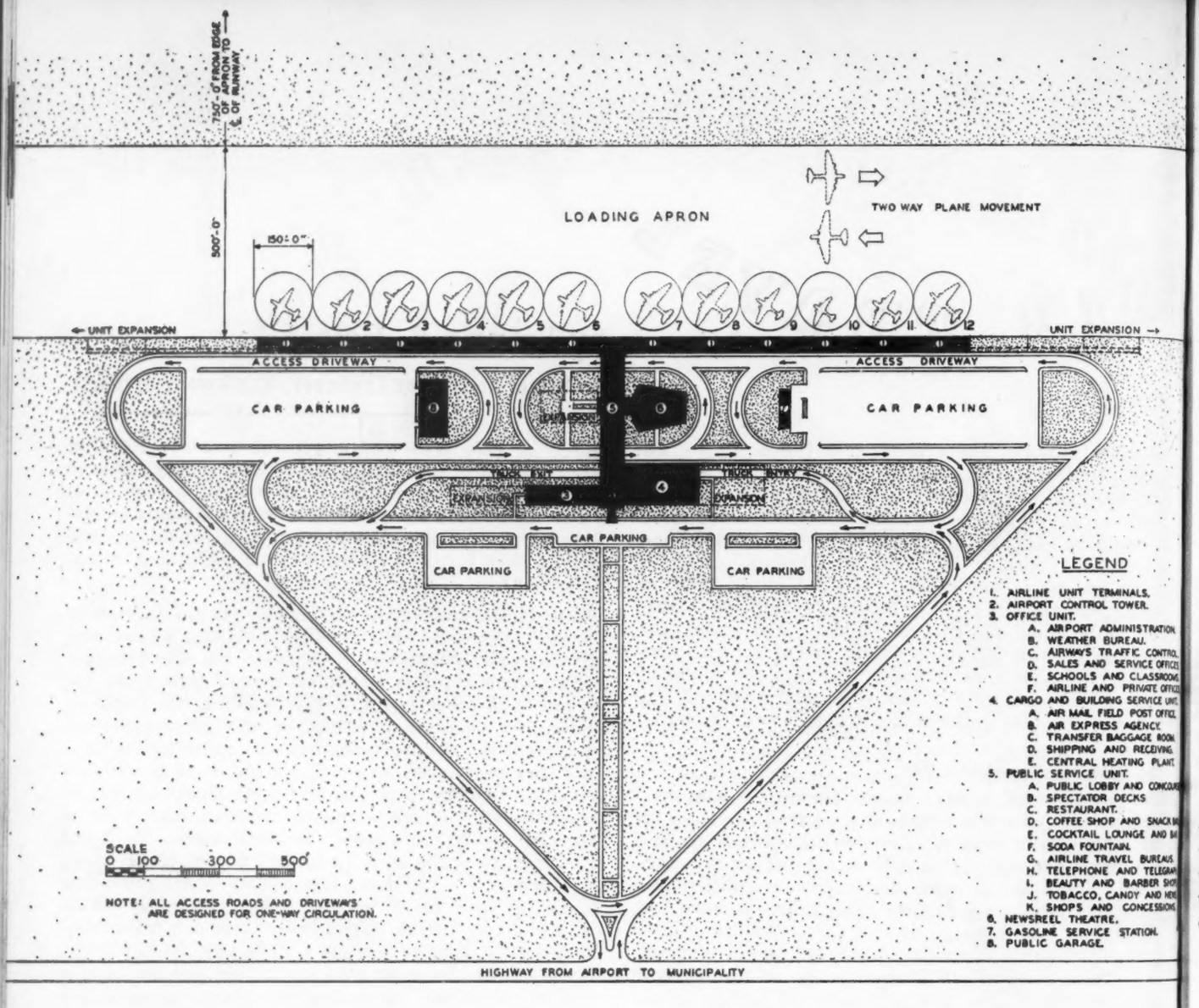
The Case for Decentralization

The prototype of many a poorly planned, monumental air terminal of the past was the railroad station with the central type of plan. The parallel between air and rail travel can be carried only so far before it breaks down. There are physical and operational differences resulting from many factors. The railroads have had the physical advantage of dealing with standard units—a standard gauge of track, a standard length of coach or pullman car with an approximately uniform height and a standard floor level at which all loading is accomplished. The airlines, on the other hand, have had and will continue to have equipment which, even within a single company, varies as to physical standards. Great variations exist in the length, height, and wingspread of aircraft, and the floor levels to which loads must be raised; in some instances the floor or deck to be loaded is in a sloping position when the aircraft is on the ground. This means that aircraft gate positions with fixed facilities for fueling, air conditioning, sewage disposal, water, power, turntables, etc., must be designed and spaced to accommodate the largest reasonably anticipated aircraft. When such positions are occupied by smaller aircraft, an operational waste of apron or gate area occurs, yet the cost of providing fixed facilities for fueling, air conditioning, sewage within a given apron area is at present too great to make it economically possible to eliminate this waste. Mobile services are possible but also expensive, and the number required constitutes an additional operational hazard.

An understanding of the physical-numerical differences in passenger and cargo handling problems of rail and air carriers is essential. Consider the 50-passenger plane which requires 150 lineal feet of gate space or, to put it in other terms, a 150-foot-diameter circle of apron area on which to maneuver into and out of loading position. In approximately the same apron area and clearances used up by this plane, it is possible to provide platform space and the eight tracks needed to accommodate sixteen standard railroad cars with a capacity of 900 passengers. In other words, the lineal feet of gate space used up by one 50-passenger plane is equivalent to the lineal feet of gate space providing access to four platforms and eight tracks on which trains of any length might load. A 20-car train handling 500 passengers will use 1500 to 1650 feet of track. While ten 50-passenger planes handling 500 passengers will require 1500 lineal feet of apron, actually, the apron area which they use could contain track and platform area for eight 20-car trains with a total capacity of 4000 persons. The amount of apron space required per person in air travel (based on 50-passenger aircraft) is roughly eight times the track and platform space required per person in rail travel. The amount of plane gate space per person is eighteen times the gate space required in rail travel. This physical difference is one of the great factors pointing toward the decentralization of air terminal facilities, as unusually great areas and distances are involved in the terminal mass handling of air passengers. It is these same physical factors which have made the solution to the



CENTRALIZED DESIGN AIRLINE TERMINAL



problem of loading air passengers and cargo under cover so difficult and so extremely expensive.

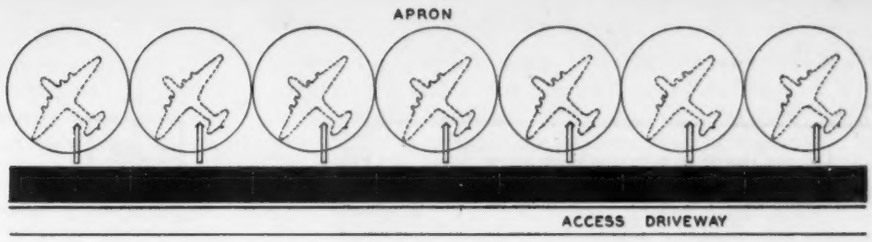
The time factor has a definite relation to the physical factors in both rail and air terminal design, but is more difficult to analyze. In air travel the passenger who is forced to enplane through a central building may have to walk several thousand feet to the plane, necessitating the "calling" of the flight a number of minutes ahead of scheduled departure. Railroad cars have several entrances; planes at the present time have only one, but the industry is looking forward to the installation of several doors in larger aircraft as a means of reducing terminal time. Aircraft must fuel at their gate position, except for some originating flights which may fuel at the hangar.

This fueling operation is time-consuming, but a ship must occupy its position until the process is completed. The fueling operation is also a function which must be closely watched and protected for safety. Railroad trains, on the other hand, usually need not wait to fuel but can change engines, while in the station, in a matter of a few minutes. The physical differences in aircraft present operational problems in passenger and cargo handling. Baggage carts may be standardized, but passenger loading steps and ramps, cargo loaders and chutes, ladders, etc., will vary with the plane. If more than one entrance is provided per plane, additional steps or ramps will be required. The railroads do not have this problem, nor the attendant one of storage for so much varied equipment. Due to the weight factor, it is very unlikely that planes will carry their access steps, etc., from place to place as an integral part of the plane.

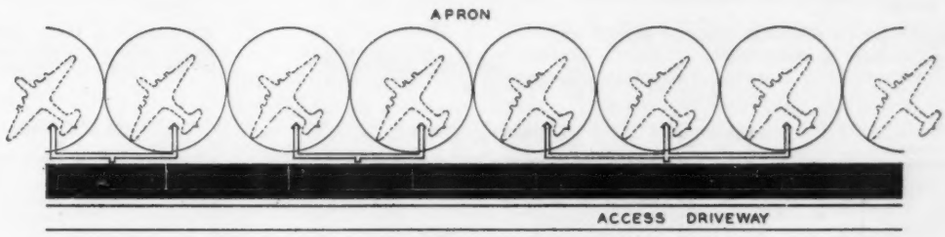
Rail travel is mass handling of people and baggage. Air travel is still personalized service, the individual handling of passengers. Air travel expects soon to be mass travel, and the airlines are looking for ways and means of expediting mass handling of passengers without eliminating the personalized service for which they are noted. Airports, in contrast to railroad stations, are usually situated some distance from the heart of the city. This location difference means that airline passengers arrive at the airport either in a private car, a taxi, an airline limousine, or a bus; and are often pre-ticketed. In the case of the airline limousine, the passenger may have already checked in at the downtown ticket office, where his ticket was picked up and his baggage checked through to destination. These pre-checked passengers are ready to board the plane when they arrive at the airport. Rail and plane ticket sales vary little in the time element, but making plane reservations and checking in plane passengers and their baggage involve a time factor which railroads do not have to consider. All plane seats are now reserved, and weight-control of passengers, baggage, and air cargo is essential. Railroads have no such problem of weight-control. In most instances railroad passengers carry their own baggage aboard, a procedure not likely to be utilized by airlines until two or more classes of air

AIR TERMINALS

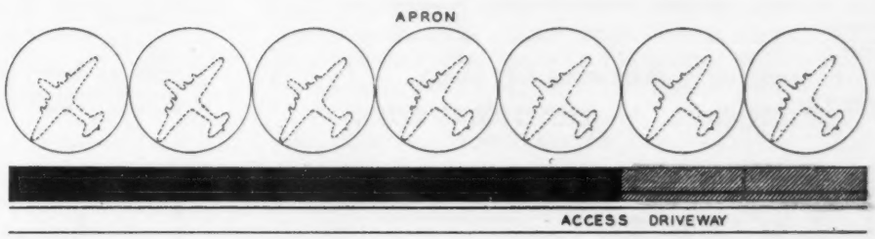
The larger air terminal might well have an "airport community center" containing necessary services and public facilities, with a small unit terminal at each gate position. Such a development permits building expansion or change in accordance with actual need.



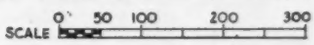
TYPICAL UNIT PLAN.



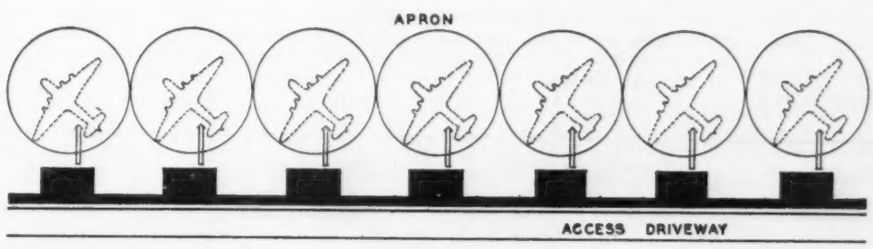
VARIATIONS IN UNIT PLAN.



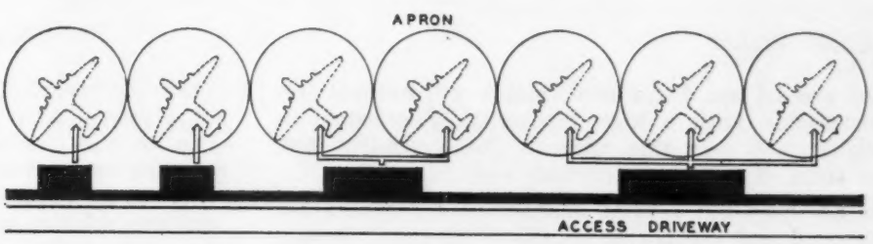
EXPANSION OF UNIT PLAN.



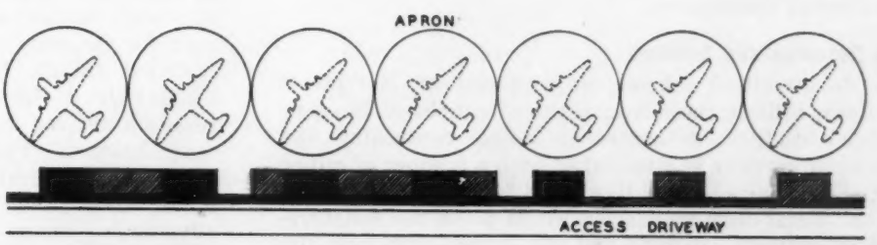
Northwest Airlines and United Airlines, at work simultaneously on the problem, arrived at very similar results. Above, United's unit scheme permits of extension only at the end of the row of continuous units. Below, Northwest's discontinuous dock scheme reduces initial building cubage and permits expansion between docks as well as at the end of the row.



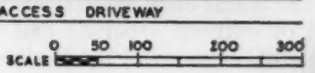
TYPICAL DOCK PLAN.

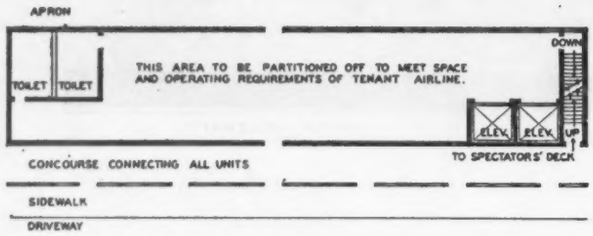


VARIATIONS IN DOCK PLAN.



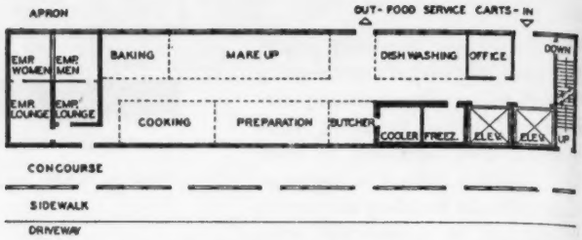
EXPANSION OF DOCK PLAN.



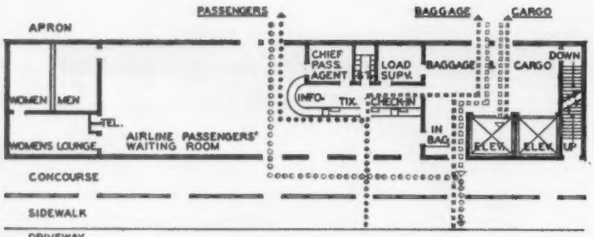


BASIC UNIT – GROUND FLOOR PLAN.
MINUS SUBDIVISION OF AIRLINE SPACE.

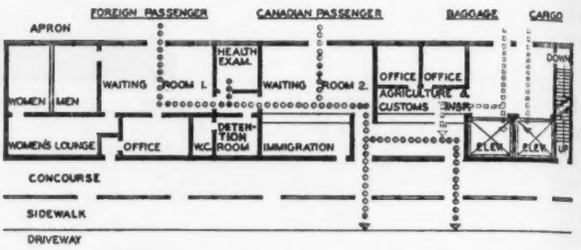
SCALE 0 10 20 30 40 50'



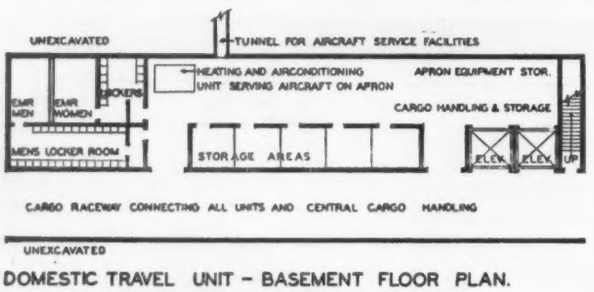
COMMISSARY UNIT – AIRCRAFT FOOD SERVICE PREPARATION.
BASEMENT PROVIDES BULK FOOD, FROZEN FOOD, AND ACCESSORIES STORAGE AS WELL AS LOCKER AND SHOWER ROOMS FOR COMMISSARY EMPLOYEES.



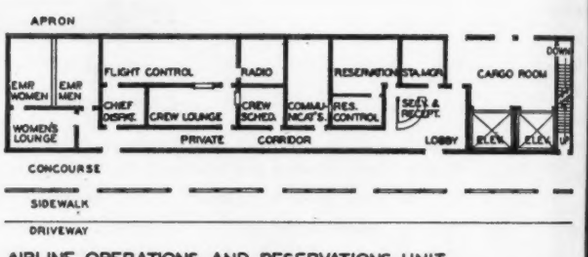
DOMESTIC TRAVEL UNIT – PASSENGERS AND CARGO.
SEE BASEMENT PLAN.
LEGEND: PASSENGERS TO PLANES ●●●, PASSENGERS FROM PLANES ○○○. BAGGAGE AND CARGO TO PLANES ▬▬, BAGGAGE AND CARGO FROM PLANES ▭▭.



FOREIGN TRAVEL UNIT – CUSTOMS AND IMMIGRATION FACILITES.
BASEMENT PROVIDES BOND ROOMS FOR CUSTOMS STORAGE AND ROOMS FOR AGRICULTURE QUARANTINE AS WELL AS EMPLOYEES' LOCKER ROOMS.

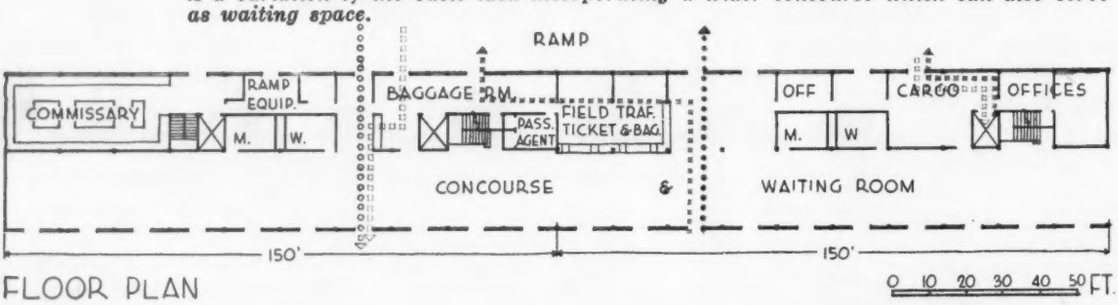


DOMESTIC TRAVEL UNIT – BASEMENT FLOOR PLAN.
GROUND FLOOR ALL-CARGO UNIT SIMILAR IN PLAN EXCEPT FOR RACEWAY.



AIRLINE OPERATIONS AND RESERVATIONS UNIT.
SPACE LAYOUT VARIES WITH EACH TENANT AIRLINE.

Above, varying developments within the shell of the standard unit. If the narrow concourse were adopted, additional waiting space would have to be provided. Below is a variation of the basic idea incorporating a wider concourse which can also serve as waiting space.



FLOOR PLAN

0 10 20 30 40 50 FT.

travel are set up. Plane reservations will probably be indispensable until a high frequency of schedule is available; and even then there is the possibility that some form of weight-control may remain.

This has been but a brief analysis of differences between rail and air travel as affects terminal design, but it illustrates the impossibility of planning air terminals on railroad standards for the centralized mass handling of passengers.

The Decentralized Solution

The decentralized scheme, as proposed by Northwest Airlines, utilizes the advantageous features of the centralized design. A central building containing the necessary services is established with a number of minor stations or units located like satellites along the loading apron. Total decentralization would mean the construction of entirely separate and wholly self-sufficient airline stations around the perimeter of the airport.

The trend toward decentralization has so far been limited to proposals of airlines which were searching for a solution to the terminal building problem. The nearest existing counterpart to the decentralized solution is the enclosed gate concourse at LaGuardia Field, New York; but this solution stops far short of the goals proposed by airlines. It was the major terminal, with its widely separated plane positions, that led Northwest Airlines to study decentralized designs. After close analysis it was seen that the decentralized solution had an advantage for the smallest station as well as for the largest terminal. While Northwest Airlines was arriving at its answer to the problem, United Air Lines in its research arrived at the same conclusion concerning decentralization. The basic scheme and underlying principles are identical in both airline solutions, although minor differences, with attendant advantages and disadvantages, occur.

Northwest Airlines proposed the discontinuous "unit"

or "dock" solution, and United Air Lines proposed the continuous "unit" solution. The Northwest Airlines' scheme allows the individual docks to be expanded to the full length of the gate position, or additional docks and gate positions can be added at either end of the apron. This is done only when needs dictate, thus keeping the original investment small until economic justification for expansion exists. The dock scheme was proposed for large terminals where it was found that the airline functions for passenger traffic and cargo handling did not at the present time require terminal facilities the entire length of the gate position. If space were desired for airline field operations, communications, offices, commissary, etc., along the length of the gate position as well, then the continuous "dock" or "unit" was required.

United Air Lines' scheme was based upon housing some of these additional functions at the apron; hence, the continuous unit. This scheme presents internal expansion difficulties where several airlines are concerned. "Cushion" functions, which can be removed to provide for expansion, must be located in units between airlines. If this is not done, the airline or lines in the center push those airlines on the ends out into new units as more gate and terminal space is required. Using light demountable partitions, the physical changes are not difficult to make; but the resulting disruption in terminal activities for the airlines required to move is not at all desirable. Since their inception, various ideas from the two solutions have been interchanged and combined so as to provide a common solution to the industry's problem.

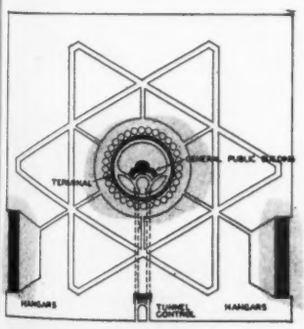
The basic premise of the decentralized scheme is the localization of the individual airline functions adjacent to the apron or gate positions, with a driveway on the off-field side so as to simplify and expedite the transition of passengers from automotive conveyances to aircraft. This permits a clear-cut separation of airline functions, from one another and from all other airport activities such as airport administration, concessions, government offices, fixed base operators, etc. Inter-connection is maintained between airlines, main public building, and administrative offices through the use of a covered concourse serving all docks or units. At terminals large enough to make the investment economical, a cargo raceway for handling transfer baggage, mail, and express should connect all airlines with one another, with the airmail field post office, and with the air express agency. This raceway can also provide space in which to run all building utilities from a central plant or control point.

The second premise is the concentration of the revenue-producing concessions, public service areas, airport administration, government, and private offices into a general public building or "airport community center." This structure is usually centrally located with respect to all gate positions. The list of facilities for such a building or buildings is long and varied. The number of facilities for an airport community center will vary with the size of the terminal and the municipality. In larger terminals it is possible to locate mail and express facilities in the general public building, or to provide smaller separate buildings (which are more easily expanded). The only airline function to be located in the general public building would be a common information center or separate airline travel bureau offices. The use of additional office space in the central public building would be a matter of individual airline policy.

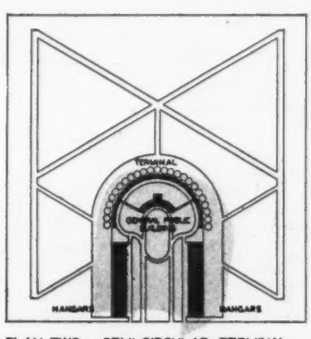
Advantages of Decentralization

Expandability has been discussed. Besides expansion in a horizontal plane, vertical expansion is possible, especially in the "units." The units should be structurally designed in the beginning to support an enclosed second story from which the large planes of the future may eventually be loaded by gangplanks. An elevated passenger drive might follow, with the old passenger drive at ground level becoming available for cargo truck operators.

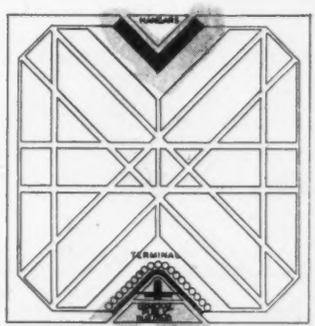
Flexibility is another advantage. The over-all scheme is adaptable to any shape of terminal area, providing sufficient room is available for expansion. The scheme may be symmetrical or unsymmetrical. The central public building may be either at the apron edge between the units, or set back, allowing the units to occupy the valuable apron frontage. Flexibility exists in the design



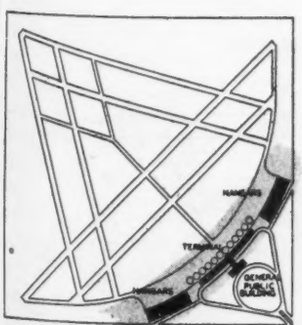
PLAN ONE - CIRCULAR TERMINAL.



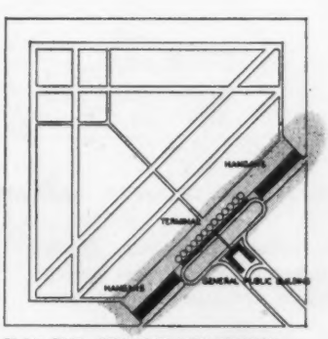
PLAN TWO - SEMI-CIRCULAR TERMINAL.



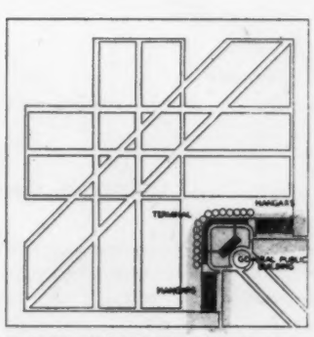
PLAN THREE - "V" SHAPED TERMINAL



PLAN FOUR - CURVED TERMINAL



PLAN FIVE - STRAIGHT LINE TERMINAL



PLAN SIX - "L" SHAPED TERMINAL

AIR TERMINALS

The decentralized dock scheme is adaptable to any shape or location of terminal buildings on the field.

of the units. Once a basic unit is established (width, length, cross section, fixed facilities such as ramps, stairs, toilets, lifts, etc.), each airline can arrange its partitions, counters, exits, and entrances to suit its own particular operating methods. Flexibility exists in the use of the units. Units may be designed for domestic operations, for foreign operations complete with customs and immigration facilities, for cargo warehouses, for airline commissaries, or for airline offices; or they may be converted from one function to another. To this end a standard cross section, free of columns, with exterior walls constructed of uniform structural bays, is desirable, in order to allow an interchange of door and window panels to provide freedom in planning.

Segregation is another advantage. Each airline has control of its own operations and can render more personalized service to its patrons. The airline passenger is separated from the general public and from cargo operations, thus simplifying passenger handling by airline personnel. Fewer opportunities will exist for mishandling cargo and passenger baggage. The spectator is given an observation deck from which he can watch apron loading activities without interference with the operations. This all helps to avoid congestion and to facilitate the mass handling of passengers.

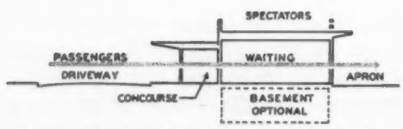
Economy is still another advantage. The decentralized terminal can be developed by stages to parallel the economic demand and justification for facilities. Thus there can be no over-expansion. The investment in decentralized terminals can be amortized over a long period without fear of obsolescence and inadequacy, which have made so many terminals economic liabilities in the past.

Passenger convenience is a great advantage. The decentralized terminal is planned primarily to expedite passenger handling and to bridge the gap between air and ground travel in the most convenient, effortless way. The passenger is no longer forced, together with the general public, through a central building where delays occur and congestion abounds. The concessions and services of the central building are still available, ready to serve the passenger who has time to spend at the terminal. The airline passenger purchases air travel because it means time and convenience to him. For this reason it is to the best interests of the industry to cut passenger time at the terminal to a minimum. Immediate passenger requirements such as toilet facilities, telephones, telegrams, vending machines for bottled drinks, candy, cigarettes, etc., can be provided in each unit terminal, thus eliminating the necessity for the hurried passenger to rush to the main building.

Safety and *efficiency* are still other advantages which result from segregation and localization of operations.

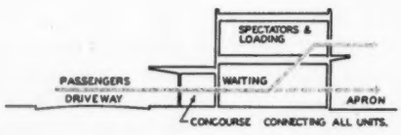
Unlimited Possibilities

The patterns and schemes which result from a decentralized solution are unlimited. The fundamental governing item is the size of the aircraft, which determines the unit terminal length or gate position size. Major



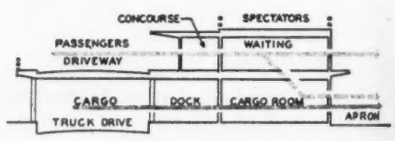
SINGLE LEVEL OPERATION—INITIAL STAGE.

CARGO HANDLING ON APRON PASSING IN FRONT OF EACH UNIT OR FROM PASSENGERS DRIVEWAY THROUGH UNIT TO APRON.

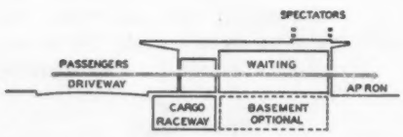


EXPANSION: PARTIAL TWO LEVEL OPERATION.

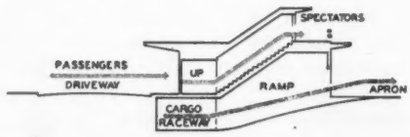
CARGO HANDLING STILL ALONG APRON OR THROUGH UNIT TO APRON.



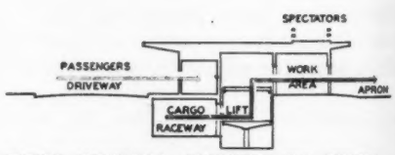
EXPANSION: FULL TWO LEVEL OPERATION.



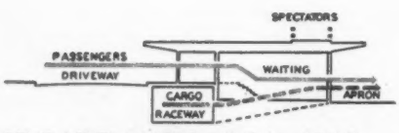
CARGO HANDLING - BASEMENT RACEWAY.



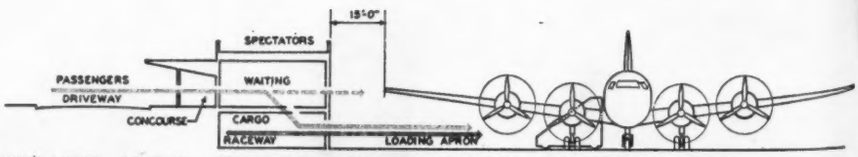
CARGO HANDLING - RAMP TO APRON.



CARGO HANDLING - ELEVATOR TO APRON.

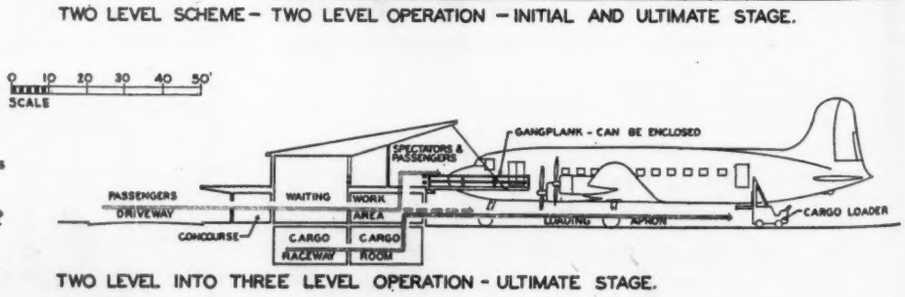


SPLIT LEVEL SCHEME - INITIAL STAGE.



TWO LEVEL SCHEME - TWO LEVEL OPERATION - INITIAL AND ULTIMATE STAGE.

TWO LEVEL OPERATION - INITIAL STAGE.



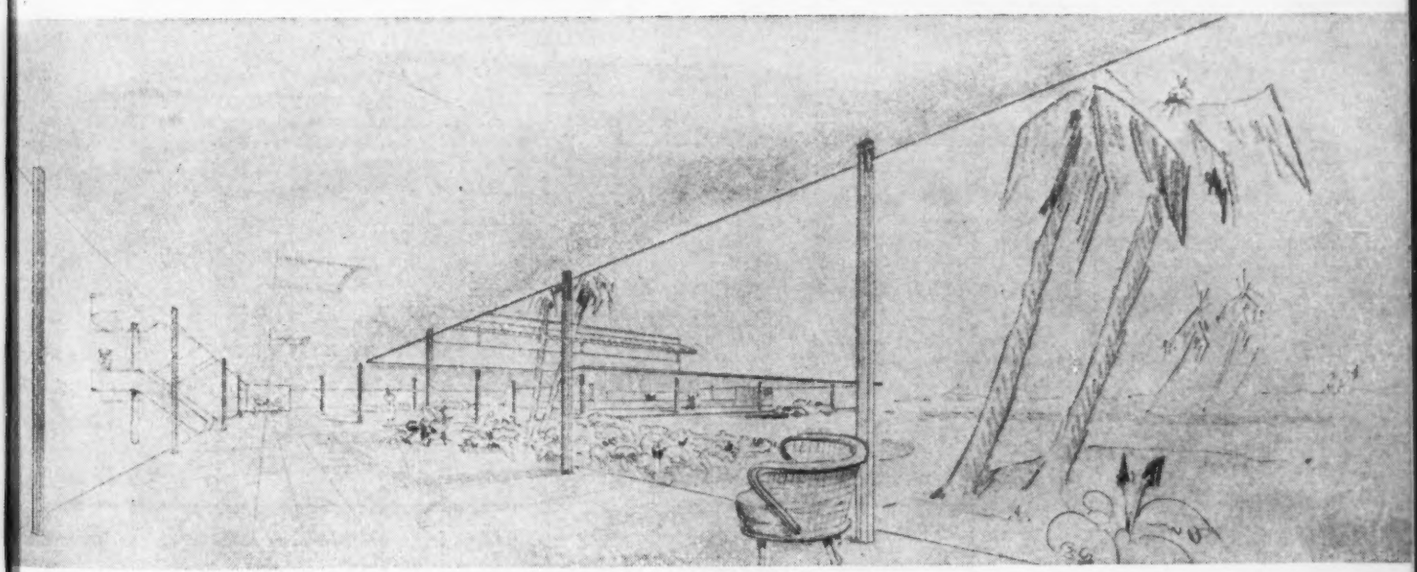
TWO LEVEL INTO THREE LEVEL OPERATION - ULTIMATE STAGE.

Northwest Airline's dock unit scheme is readily susceptible to vertical expansion. Units should be structurally designed in the beginning to support a second story from which future large planes may be loaded. Eventually the passenger driveway might also be elevated.

terminals are now being designed with gate positions 150 feet on centers, but 175 feet is considered ideal. Minor stations serving one or two airlines can get by with units (not gate positions) as short as 75 to 100 feet in length. Unit terminals can be designed to any width, but a 30-foot unit, plus a 10-foot combination vestibule and concourse, has been regarded as the minimum.

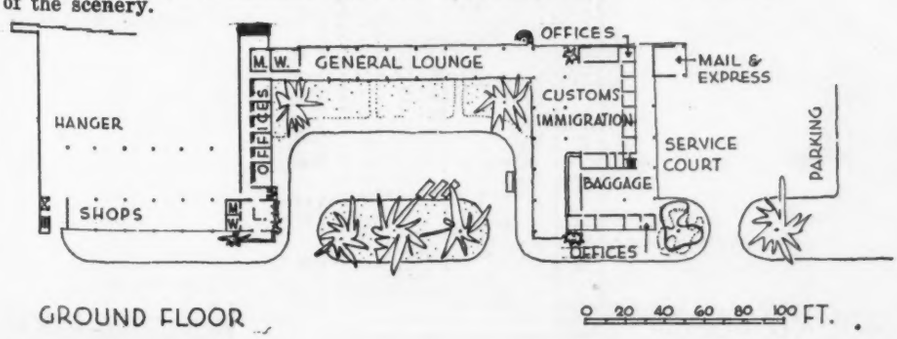
The use of mechanical and electronic aids will offset the strain on communications caused by decentralization. The major terminal will require, for passenger and employee use, an intra-airport system of ground transportation connecting all unit terminals with the general public building. Conveyor belts or cargo trains will connect the unit terminals with the central cargo functions. Impressive, though not monumental, architectural solutions can result through establishment of a basic "appearance" scheme for the over-all terminal development. Adequate airline publicity and directional assistance can be obtained through the use of controlled signs on each unit without marring the architectural effect. Above all, it is important to locate the decentralized scheme on the airport so as to provide space for the maximum anticipated expansion without interfering with runway clearances or fixed construction, as well as to provide for adequate vehicular circulation and parking. The decentralized scheme should not result in stereotyped solutions; fundamentally, it is a planning principle which serves as a guide, not a limit.

In the remainder of this article numerous applications of the unit idea, as well as several examples of possible specialized developments, are presented. All are schemes developed by the architectural department of Northwest Airlines under the supervision of Francis R. Meisch.



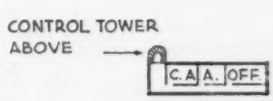
TERMINAL BUILDING FOR A SITE IN HAWAII

This design was prepared to indicate the type and extent of facilities which the airline would require if it should extend its service to Honolulu. Though not a "unit" development, the same principles of traffic flow govern its arrangement. The general lounge, glazed on both walls and having above it a promenade deck for sightseers, takes full advantage of the scenery.

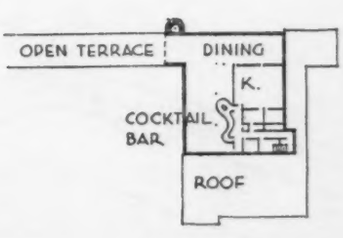


GROUND FLOOR

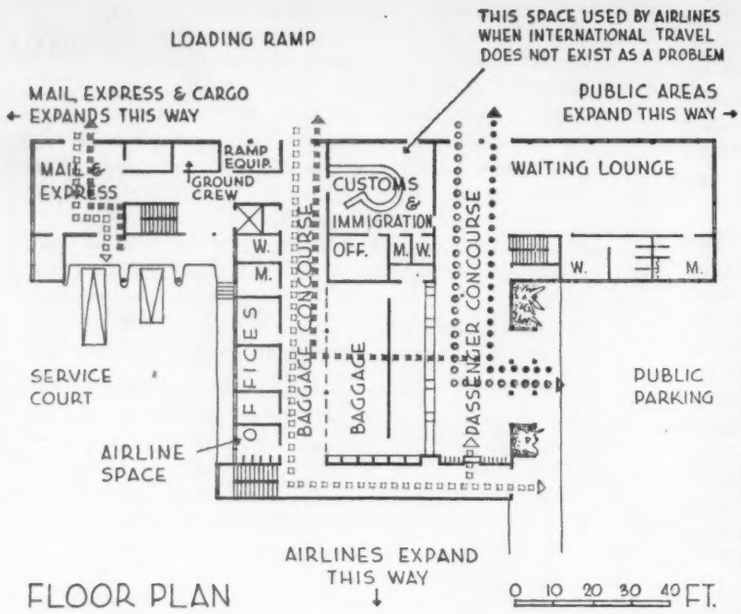
0 20 40 60 80 100 FT.



THIRD FLOOR



SECOND FLOOR 0 20 40 FT.

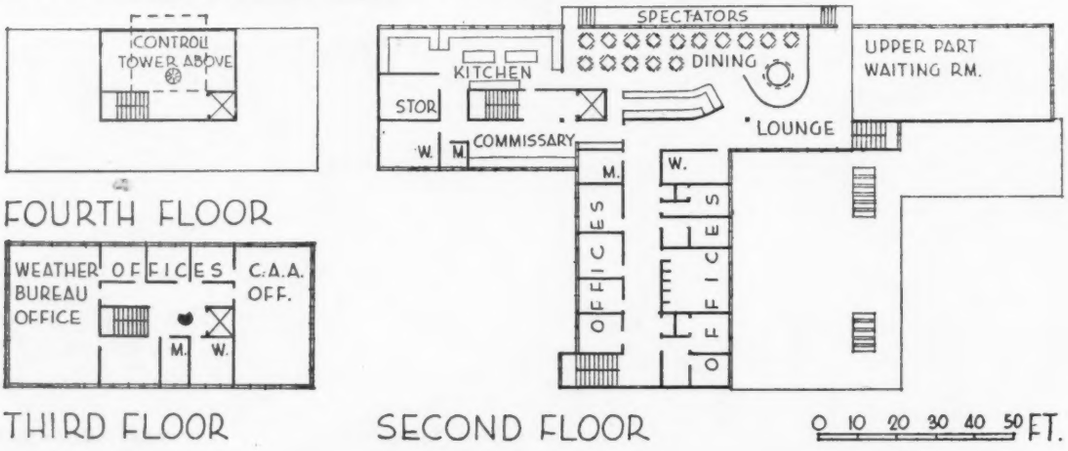


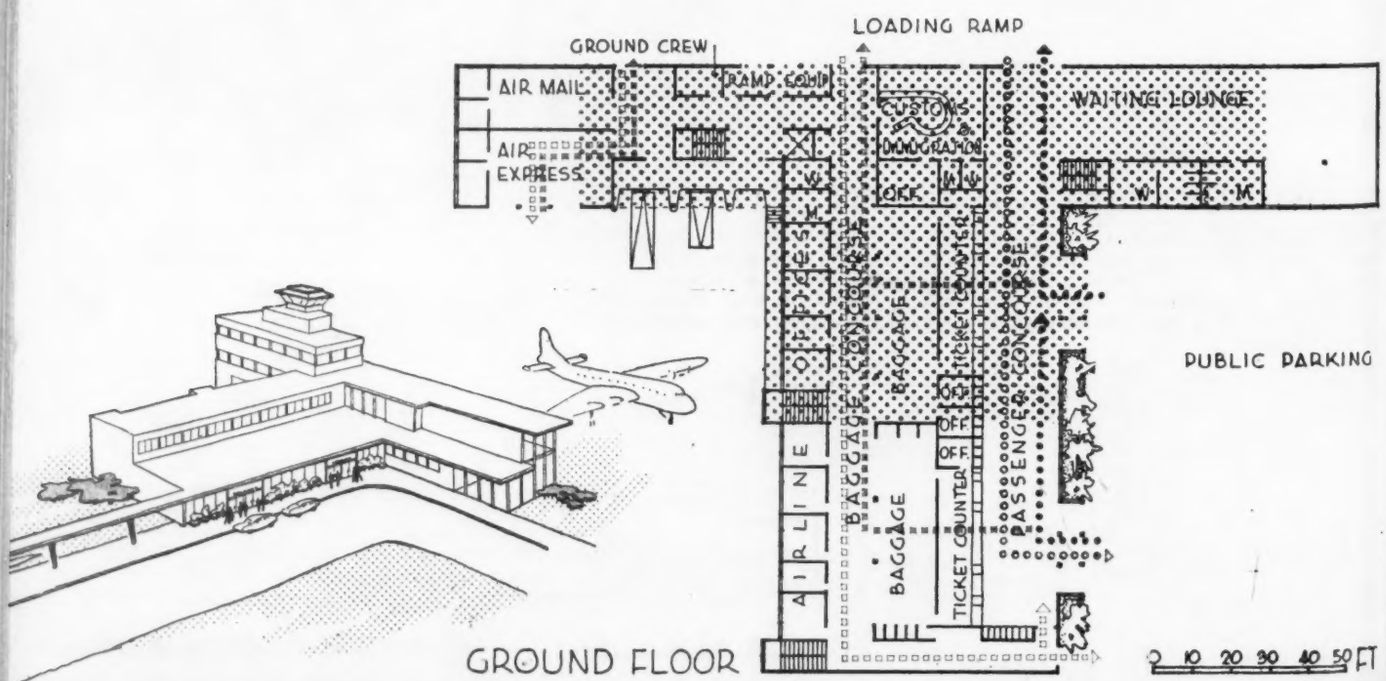
This small, combined administration building and airline terminal, adaptable to many a proposed postwar airfield, can be expanded both horizontally and vertically. Originally only one story high, it can have its wings extended, or stories added, or both—piecemeal or all at once. It might conceivably be so altered as to interior arrangements that unit docks could be added along the loading apron. In the ground floor plan of the final stage, the original extent is indicated by colored shading.

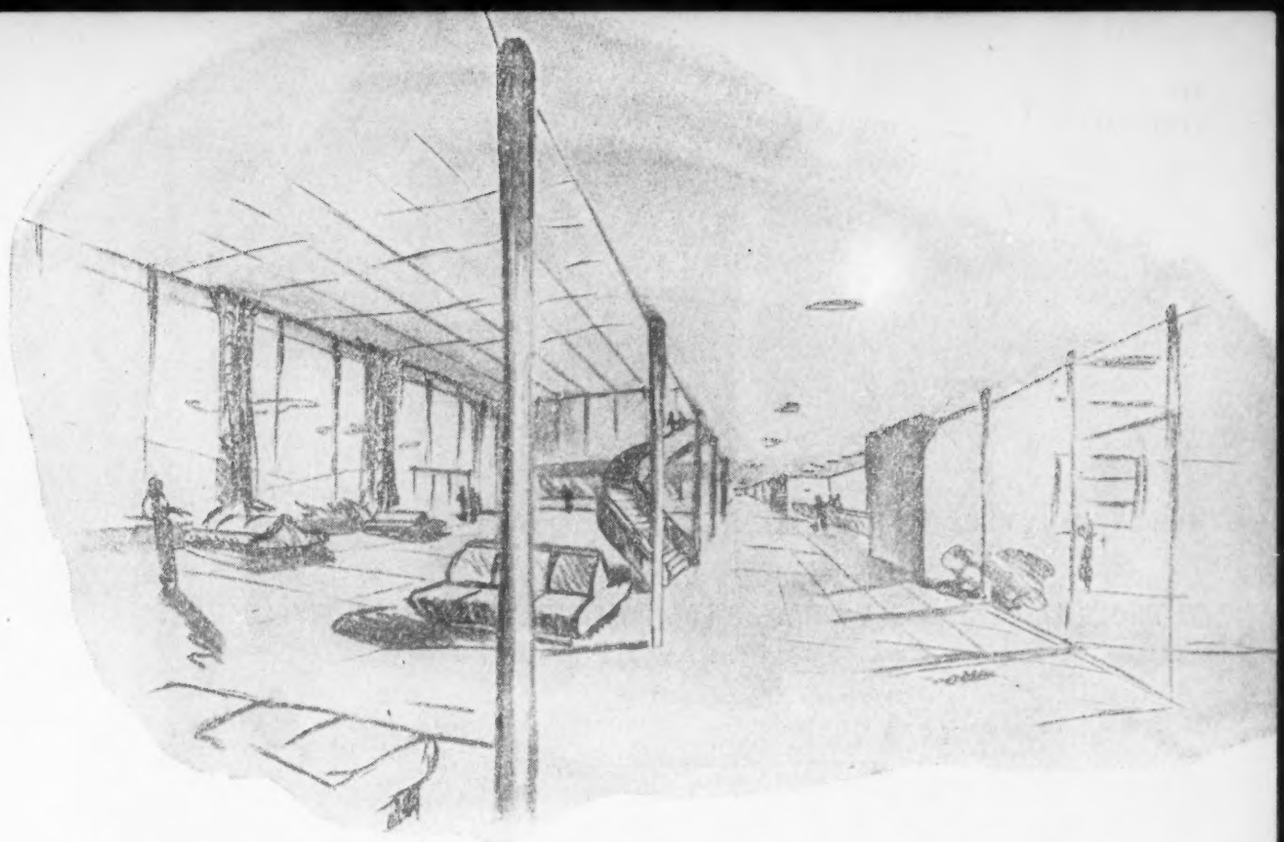
INITIAL STAGE

ADMINISTRATION BUILDING DESIGNED TO EXPAND AS NEED ARISES

FINAL STAGE

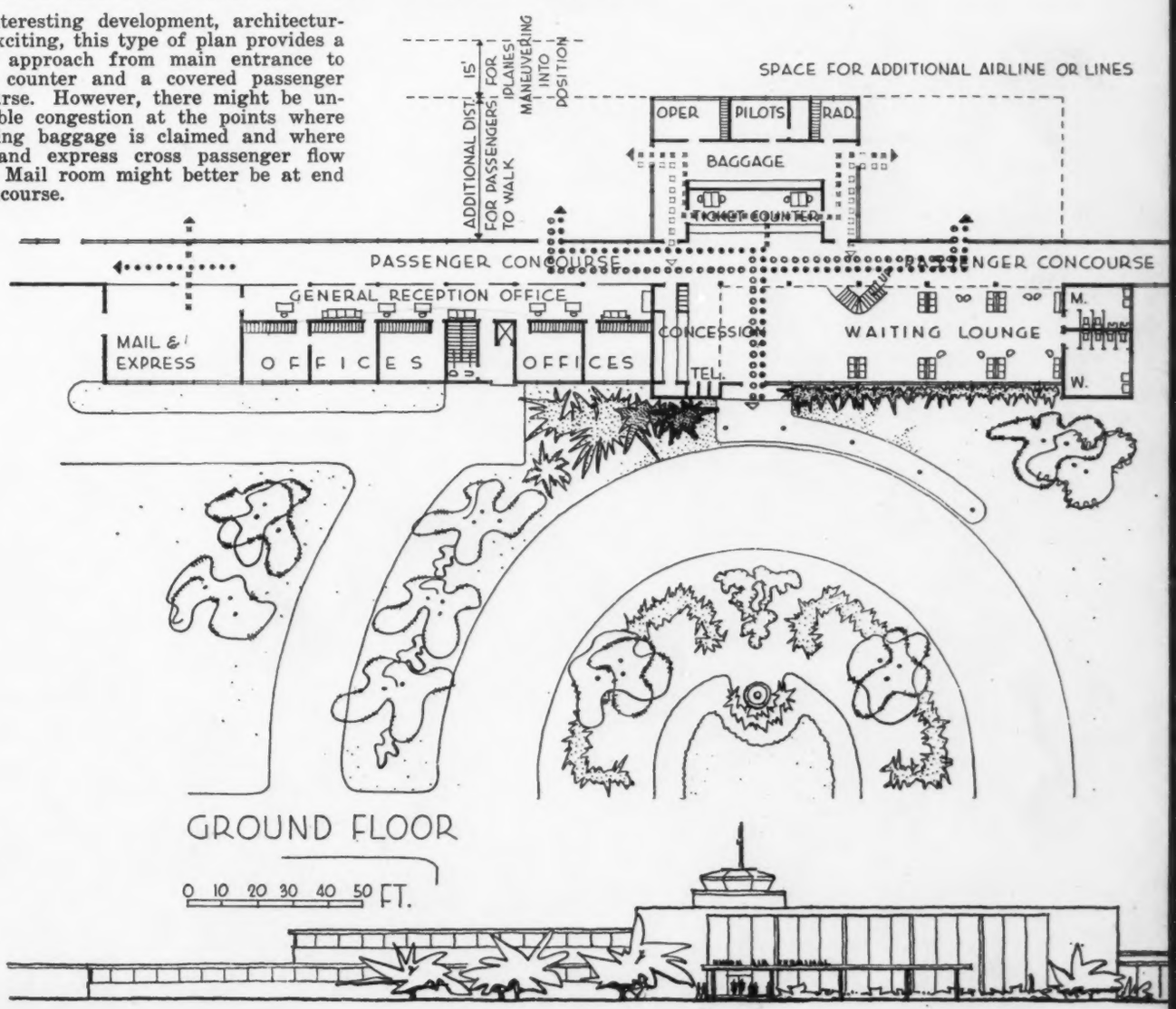






ADMINISTRATION BUILDING FOR A LARGER AIRPORT

An interesting development, architecturally exciting, this type of plan provides a direct approach from main entrance to ticket counter and a covered passenger concourse. However, there might be undesirable congestion at the points where incoming baggage is claimed and where mail and express cross passenger flow lines. Mail room might better be at end of concourse.



CONTROL TOWER FLOOR PLAN

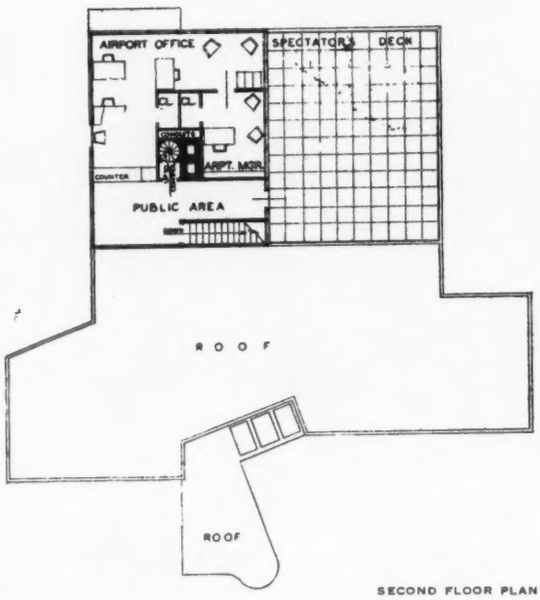
THE COUNTRY CLUB TYPE OF AIRPORT

REQUIRES AN EXPANDABLE BUILDING FOR POSSIBLE COMMERCIAL DEVELOPMENTS

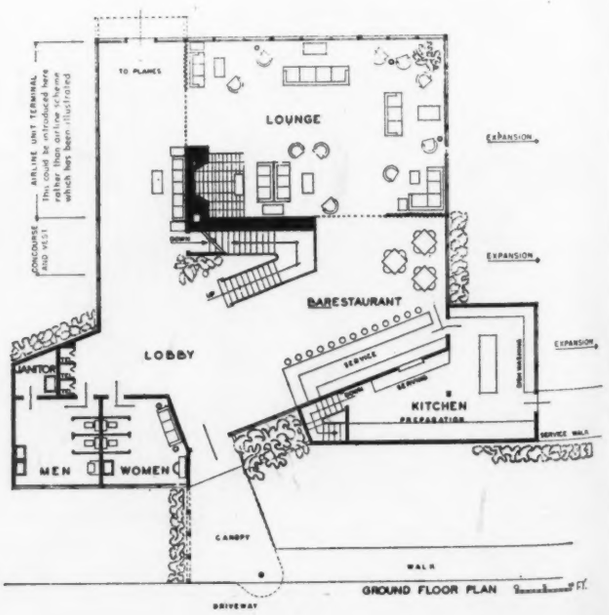
If private flying is to increase rapidly in volume after this war (and many people are doing more than guessing that it will) then private flying fields will become a necessity. But it would be folly to design the buildings which they will require without thought for potential commercial development. Even if the private field eventually becomes only a minor "way station," it will need facilities for passengers and some airline functions.

On these two pages is shown a conception of a clubhouse, for a private field, which can be enlarged to accommodate passengers and other commercial traffic. The enlarged building is shown on the following pages.

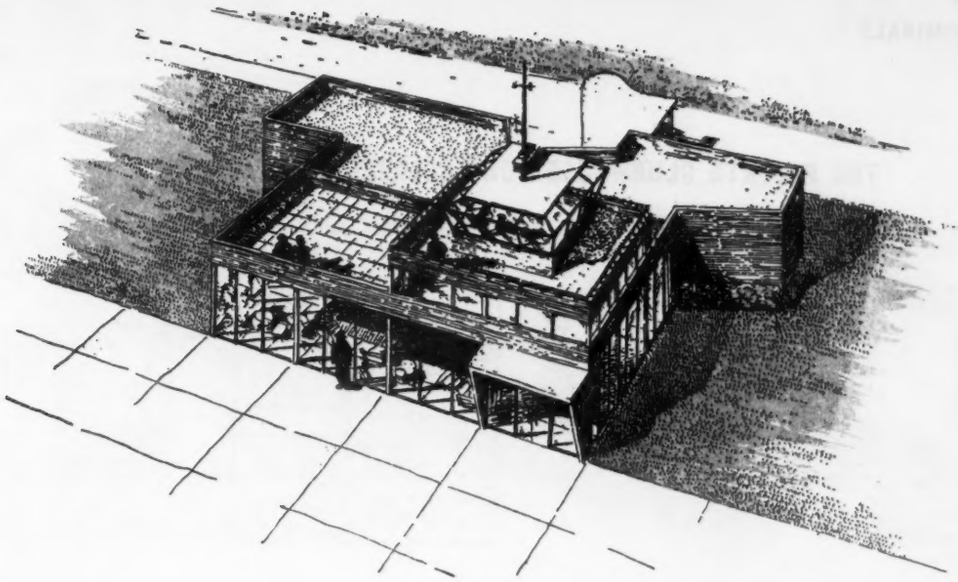
This is a preliminary study only, and like many preliminaries has its faults. When he submitted it Mr. Meisch called attention to some of these. For instance, location of the chimney is poor. Rising through the control tower as it does, it obstructs visibility; it should be relocated so it would not interfere with either the view or the operation of delicate weather-recording instruments. This would necessitate restudy of the first-floor fireplace location.

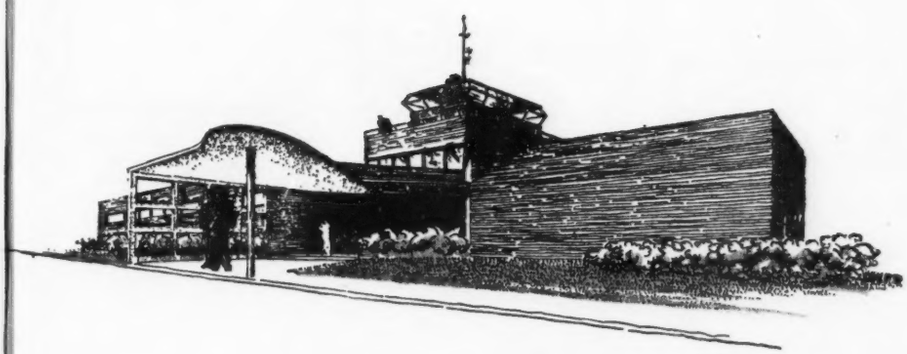


SECOND FLOOR PLAN

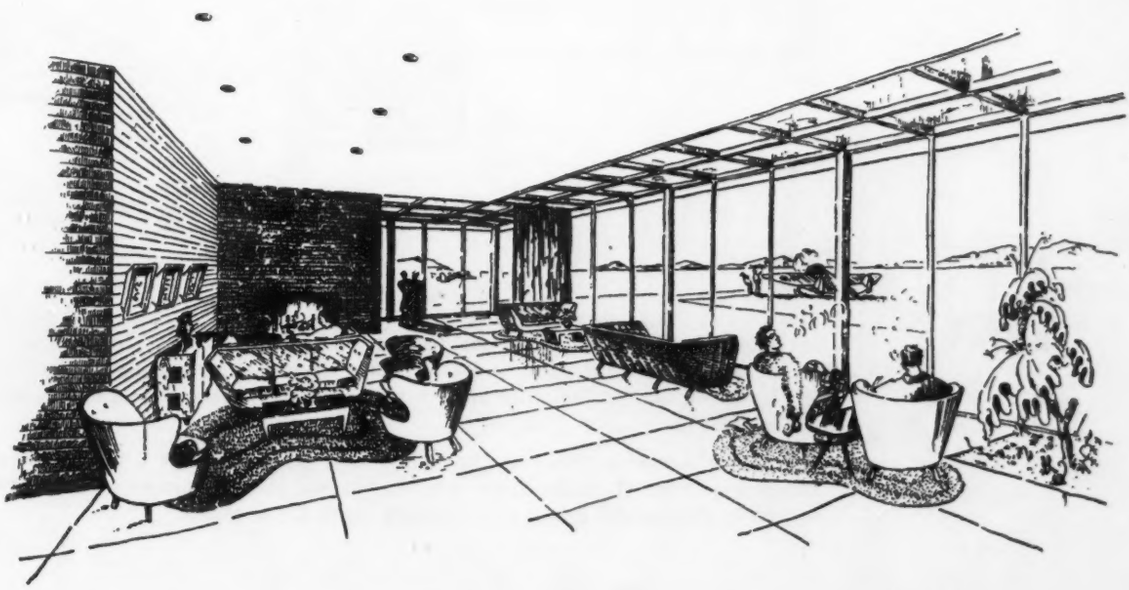


GROUND FLOOR PLAN

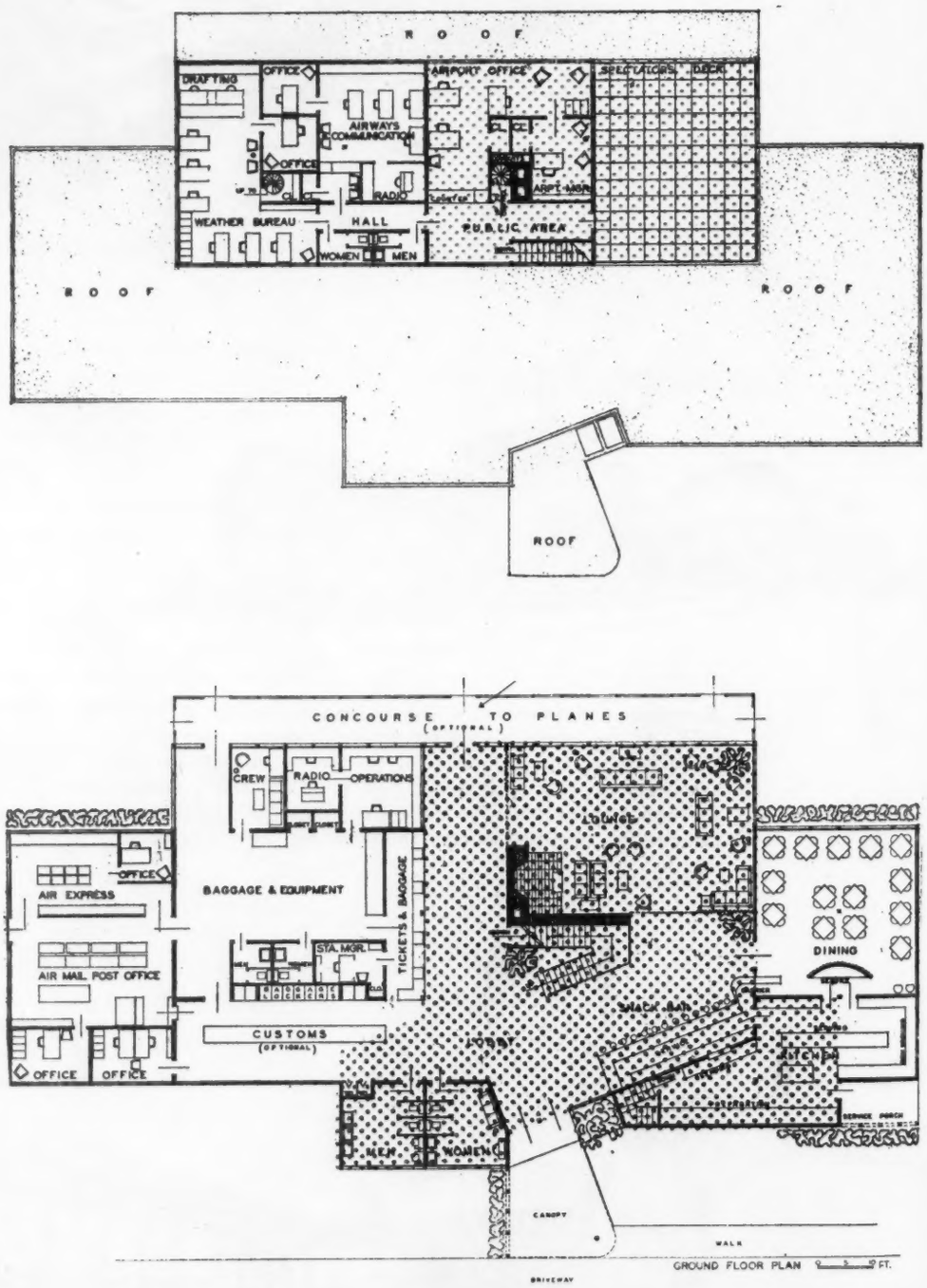




Exteriors and interior of the clubhouse for the private field. At top, aerial view from the field; center, view from the driveway; below, interior of the lounge looking toward the fireplace wall. The flying field is at the right, visible through a glass wall. To understand how the addition of commercial facilities affects the building, turn the page.

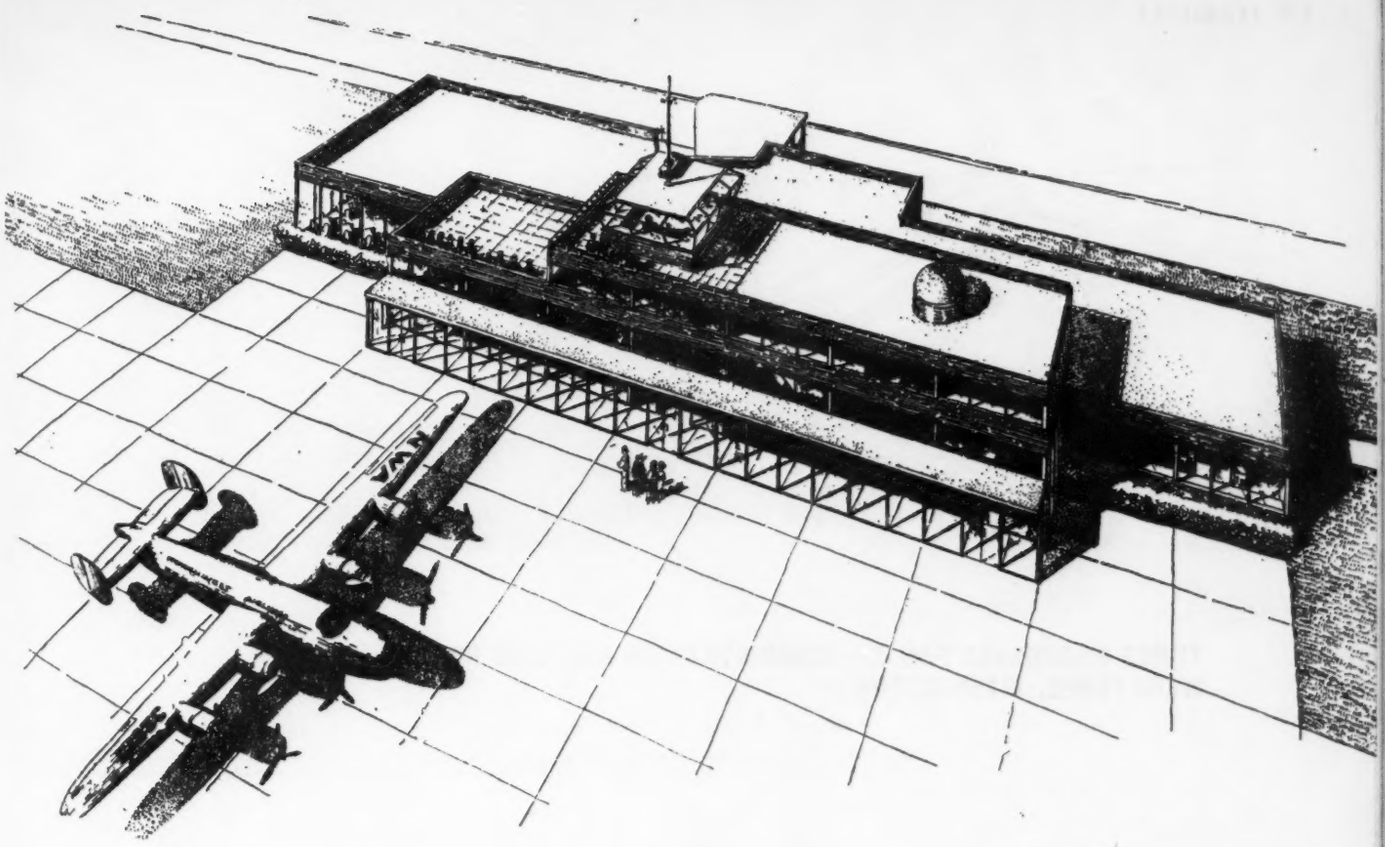


THE PRIVATE CLUBHOUSE ADDS COMMERCIAL FACILITIES

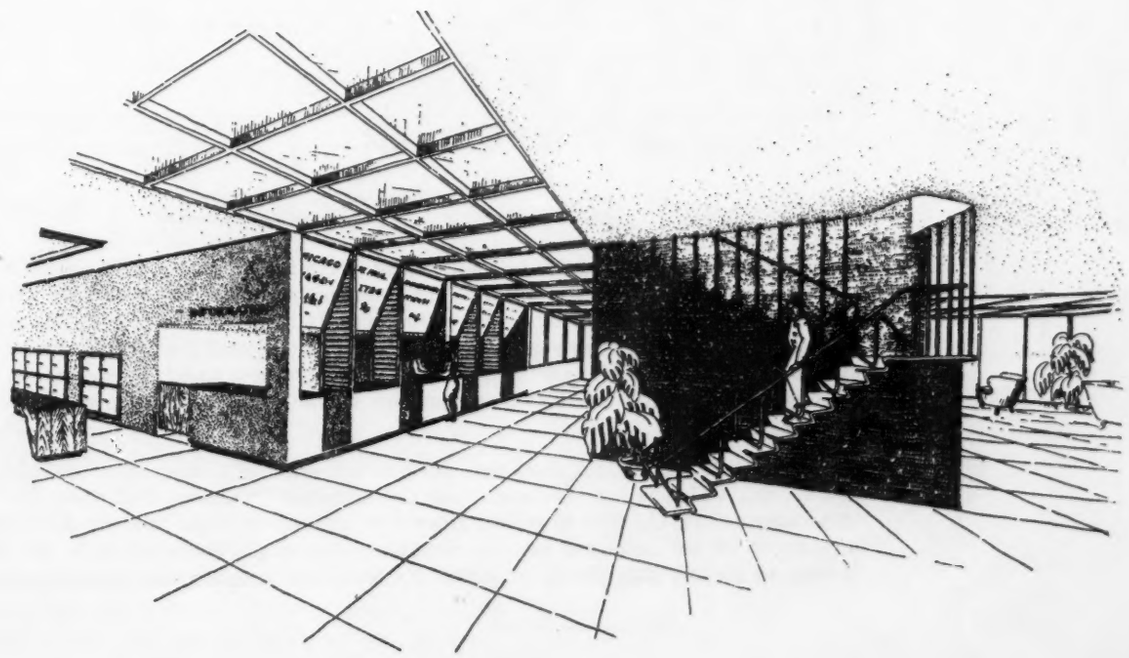


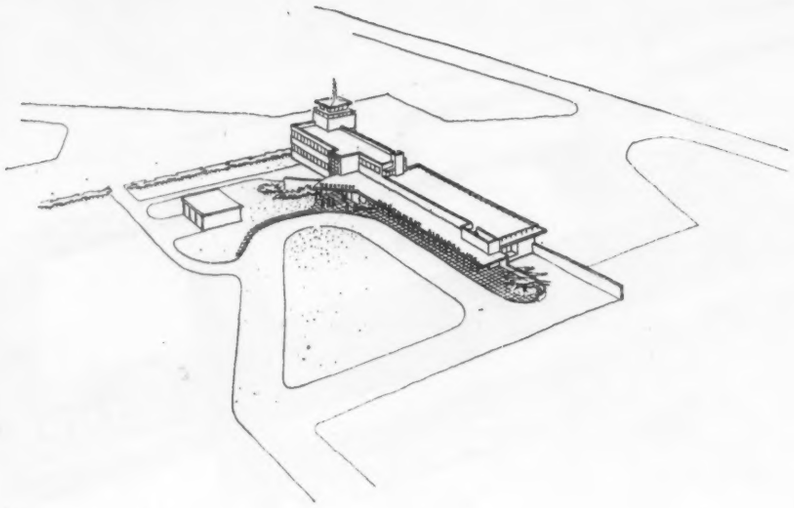
The area of the former clubhouse, detailed on the preceding page, is shown by colored shading. This project was an early development in Northwest Airlines' architectural department; currently they would advocate adding a standard unit terminal to the left-hand side of the clubhouse area, rather than the specialized—and possibly limiting—plan shown.

Mr. Meisch has also criticized the second floor layout in that a better relationship is required between CAA facilities, weather bureau, pilots' chart room, and airport office. Access to the control tower is preferably from CAA offices.

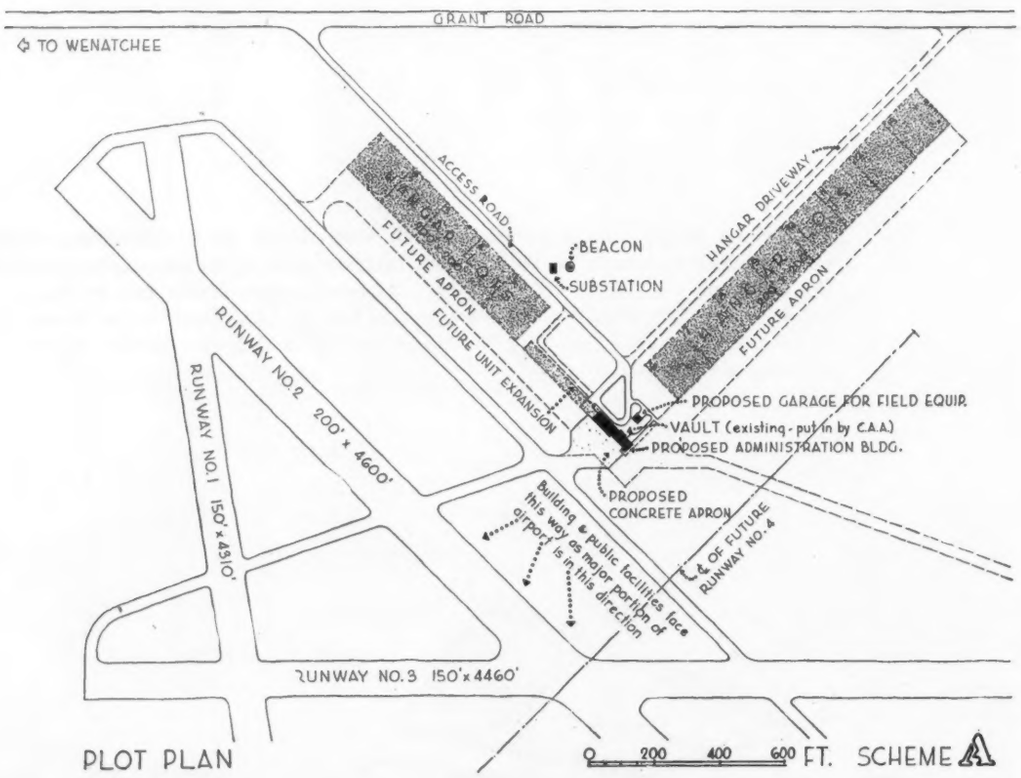


Two views of the small terminal which started out as a clubhouse; above, aerial perspective from the flying field; below, interior showing ticket counter which replaced the left-hand wall of the old building. Although some faults can be found with the building as a terminal, the whole conception has an important virtue: it can be altered economically to suit changing needs—something which can hardly be said of most existing air terminals.





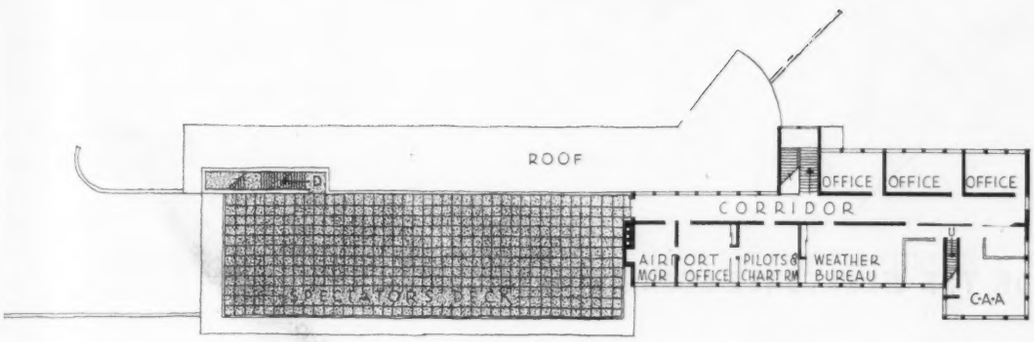
THREE PROPOSALS FOR AN ADMINISTRATION BUILDING FOR WENATCHEE, WASHINGTON


GRANT ROAD
TO WENATCHEE
ACCESS ROAD
HANGAR
FUTURE APRON
BEACON
SUBSTATION
HANGAR DRIVEWAY
FUTURE APRON
FUTURE UNIT EXPANSION
RUNWAY NO.2 200' x 4600'
RUNWAY NO.1 150' x 4310'
PROPOSED GARAGE FOR FIELD EQUIP.
VAULT (existing - put in by C.A.A.)
PROPOSED ADMINISTRATION BLDG.
PROPOSED CONCRETE APRON
Building & public facilities face this way as major portion of airport is in this direction
℄ OF FUTURE RUNWAY NO. 4
RUNWAY NO. 3 150' x 4460'
PLOT PLAN
0 200 400 600 FT. SCHEME A

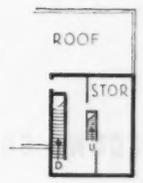
Wenatchee, a small community in the State of Washington, required an administration and terminal building for its airport. The community receives scheduled air transport service, but the present extent of use is limited and traffic at the port is not expected to grow beyond a reasonably modest maximum. In this and the two following pages are shown Northwest Airlines' suggestions, which are now under consideration. They embody the company's latest thinking on unit terminal design in a rather interesting fashion.

CAA had provided certain facilities, such as an existing transformer vault, runway layout, etc., which had to be taken into consideration. Northwest Airlines has made three suggestions, the first of which, Scheme A, appears on these two pages. Scheme A appears to be too large for present conditions, but might be required in the future. Notice, on airport plan above, provision for both unit terminal and hangar expansion.

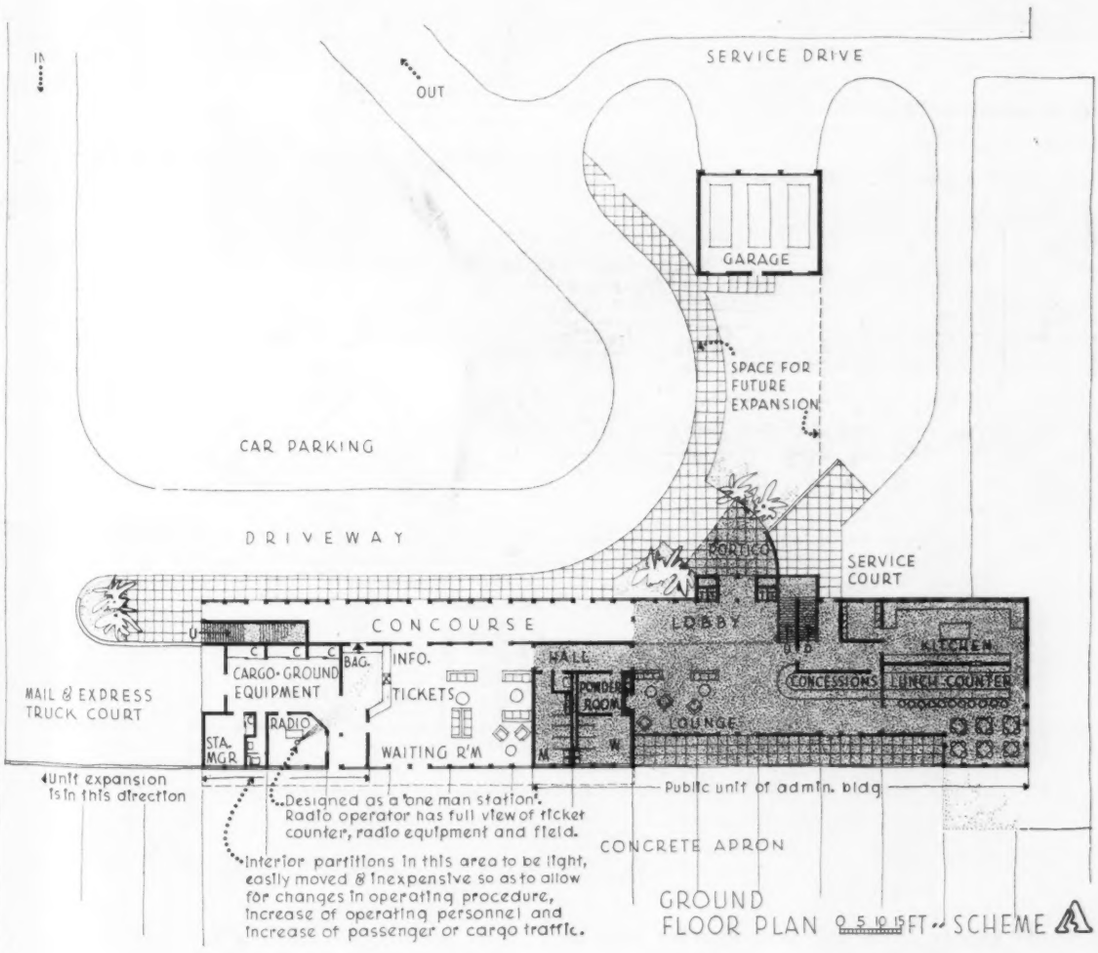
TOWER PLAN
0 5 10 15 20 25 FT



SECOND FLOOR PLAN 0 5 10 15 FT · · SCHEME A

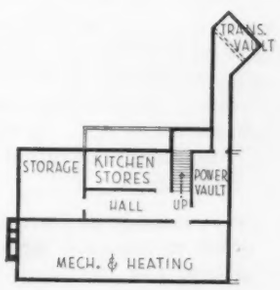


ROOF LEVEL PLAN 0 5 10 FT

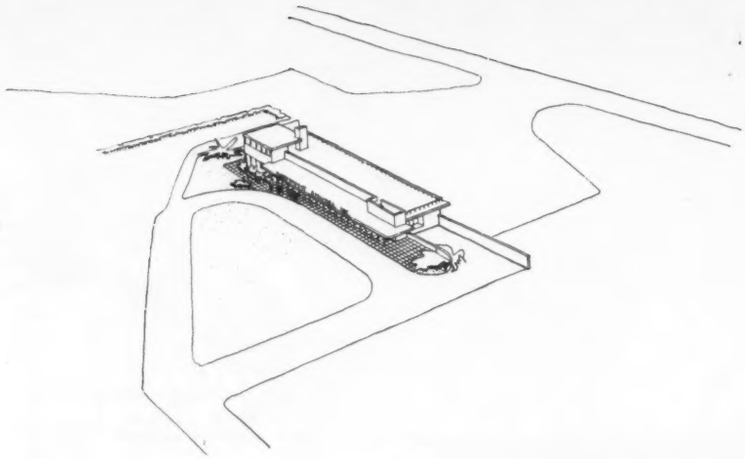


GROUND FLOOR PLAN 0 5 10 15 FT · · SCHEME A

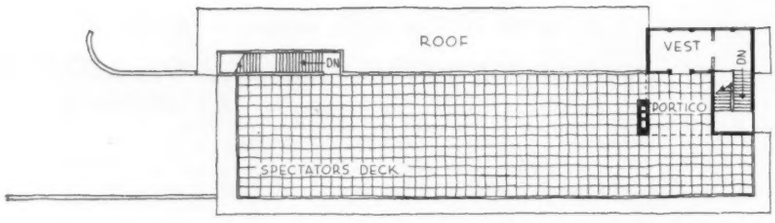
Gray areas in plans above show extent of public areas. In some cases, the concourse is considered to be entirely public space; but it might also be considered a passenger concourse, particularly if terminal units are added as indicated, and hence is here included in the area from which the general public might be excluded. Again, the toilets might be considered part of the unit terminal rather than public space; in so small a building one set of such facilities can serve both parts.



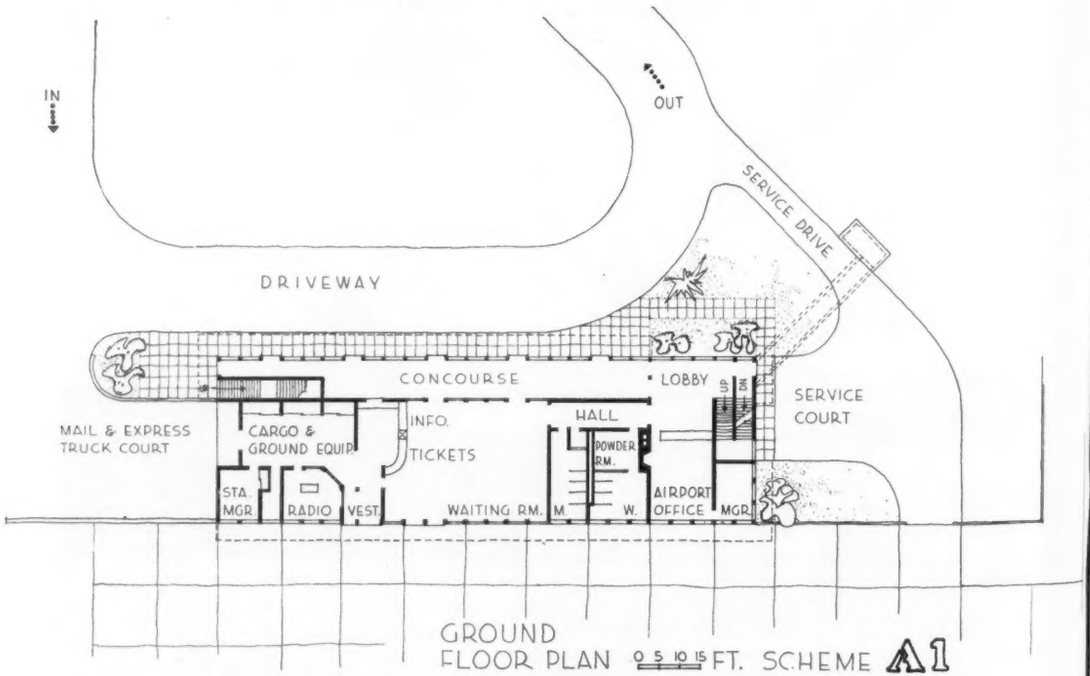
BASEMENT PLAN 0 5 10 FT



SECOND SCHEME FOR THE WENATCHEE ADMINISTRATION BUILDING



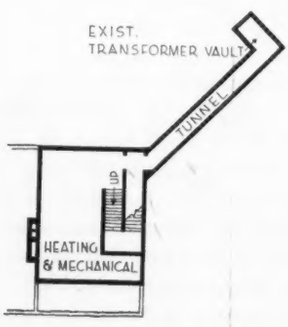
SECOND FLOOR PLAN 0 5 10 15 FT.



GROUND FLOOR PLAN 0 5 10 15 FT. SCHEME A1

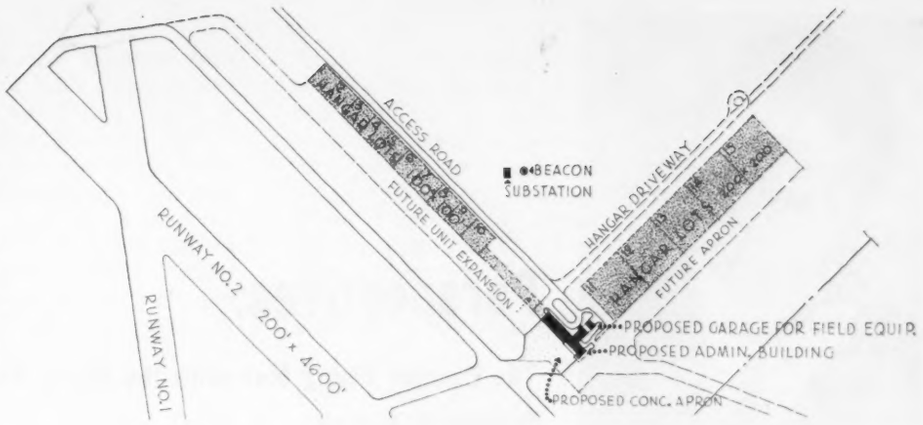
This second scheme would appear to be the most sensible type of solution for current needs, and can be expanded into Scheme A, shown on the preceding page, when conditions warrant. Like Scheme A, it is designed for "one-man" operation. Public facilities are limited to a deck for spectators, to which there is access directly from the walk and driveway. Aside from the unit terminal, the building contains only an office for the airport manager and his small staff. In all these schemes the amount of concrete paving necessary for initial traffic is held to a minimum.

According to the author, the V-shaped site, so common at CAA-planned ports, is one of the most difficult for which to design a terminal if proper automotive circulation, expandability, and flexibility in use are to receive due consideration.

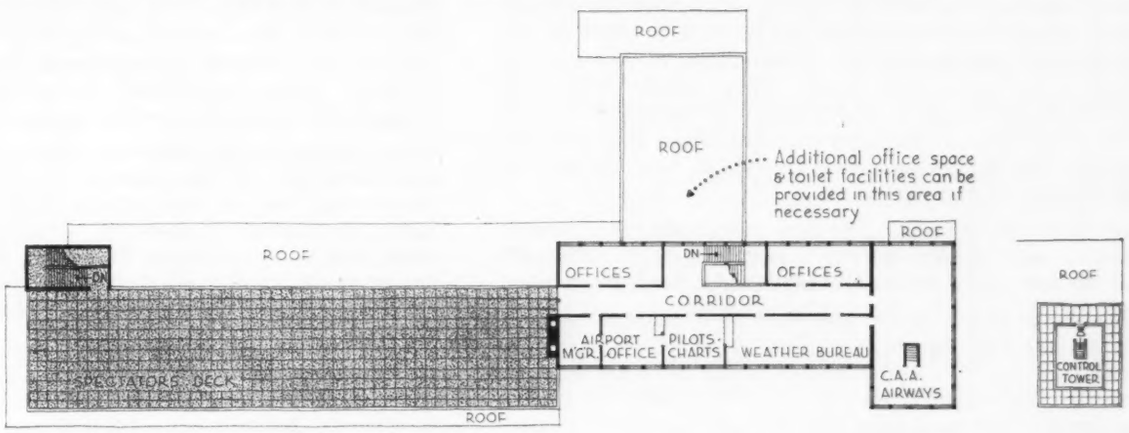


BASEMENT PLAN 0 5 10 15 FT.

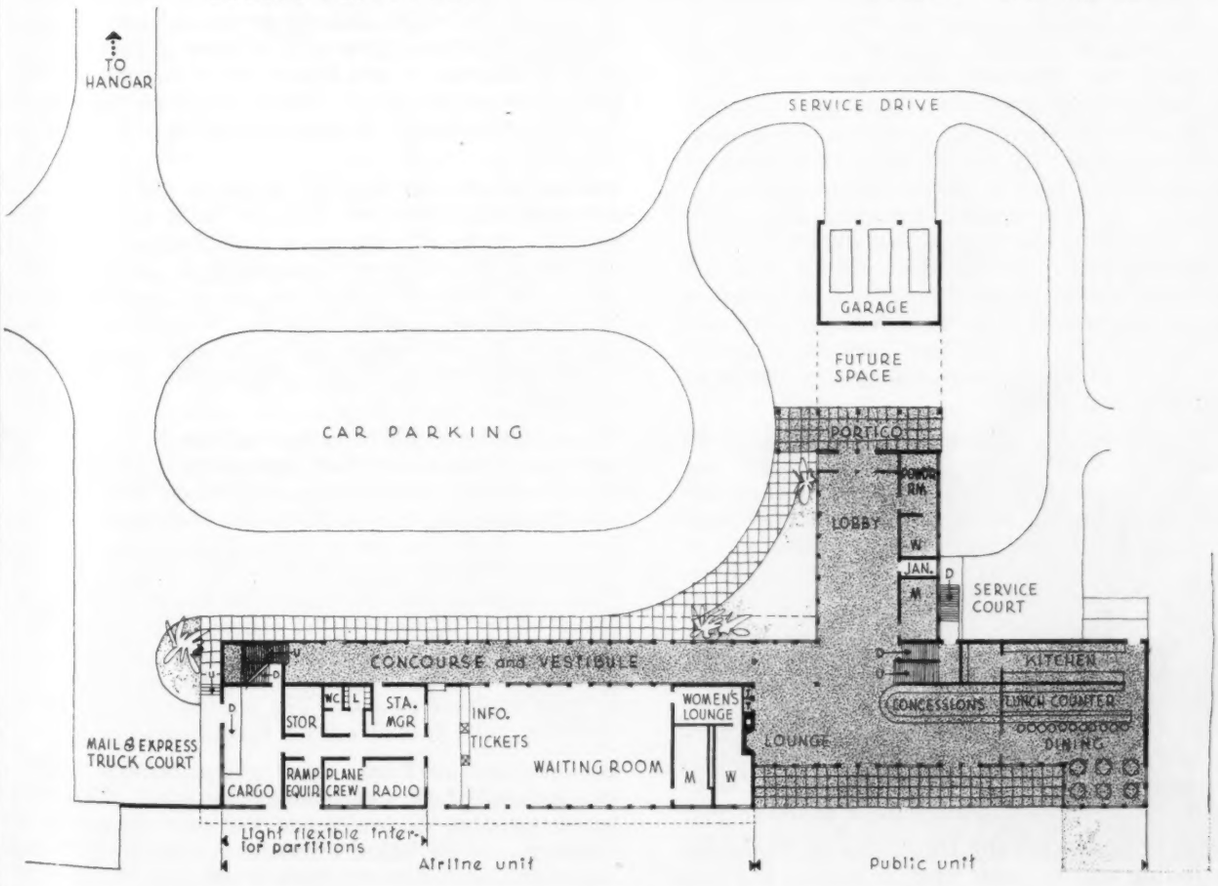
Plot plan for Scheme B, substantially similar to that for Scheme A, has provisions for two different kinds of hangars: small, for individual planes; large, to house several planes each. Only one access road is needed at present, although another can be added if needed. A building of this size seems unwarranted for present traffic volume and the forseeable future; it would require too large a staff for economical operation, particularly in airline offices. Basement plan is substantially the same as for previous schemes.



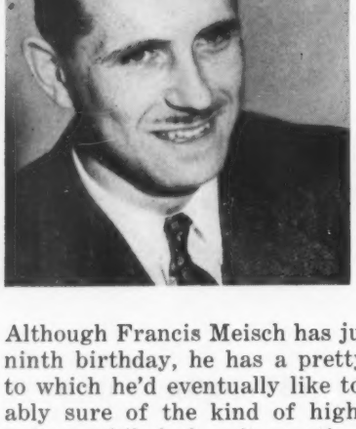
THIRD SCHEME FOR WENATCHEE SEEMS TOO AMBITIOUS



SECOND FLOOR PLAN 0 5 10 15 FT. SCHEME B TOWER



GROUND FLOOR PLAN 0 5 10 15 FT SCHEME B



Perspectives:

The Earnest Young Man with the Flying Parti: Francis R. Meisch

Although Francis Meisch has just celebrated his twenty-ninth birthday, he has a pretty good idea of the place to which he'd eventually like to retire. He was reasonably sure of the kind of higher education he wanted quite a while before it was time for him to start it. He looked around, during the early stages of the current war, for a job which would help prosecute it and, at the same time, had a rosy future. He satisfied himself that the aviation industry fulfilled these two requirements, and he got an architectural job with an airline. He's done pretty well at it.

He is not smug in being so sure of himself; far from it. He is only deadly serious about his work. Meisch's ideals are pretty strongly with him, at work or at play.

As long as he can remember, Francis R. Meisch has been interested—as he deprecatingly puts it—in drawing and painting. We aren't sure how far back his memory carries, so we can't tell you about his being born with a brush in his hand; but we can state that he was born, and where: in St. Paul, Minnesota, on October 9, 1915. That is a matter of record. Furthermore he lived in St. Paul until he finished his formal education, and St. Paul is the site of his present home office. Chronologically, the story goes something like this:

Meisch acquired some facility in sketching, together with an appreciation of nature, during summer vacations from high school. He spent most of these working on his grandmother's farm in the hilly country of southeastern Minnesota. The facility developed into a certain ability and led, before high school days were over, to an intense interest in architecture. By the time college days came along, he was sure that architecture was to be his profession, even though those were also the days immediately after the New York stock market hit bottom, when architects were selling their share of apples on city street corners.

When he entered college, Meisch had already read both Louis Sullivan's "Autobiography of an Idea" and Wright's "Autobiography." He expected to find the study of architecture a logical, exciting adventure. He says he was disappointed to find that the best "philosophy of design" available involved considerable cold cribbing. It was rather an unpleasant experience, that freshman year; faculty and students alike were confused over what architecture really was. Meisch began to wonder if his reading had misled him. He felt pretty bad over it at times, and after one year he quit to go to work for an architect—any architect—to find out for himself whether architecture *was* the glamorously idealistic profession he had envisioned, or just another business, albeit one in which facility with a pencil helped.

By the time he re-entered the University of Minnesota he had a feeling that he knew what he wanted out of a formal education. He worked his way through a five-year course in four and a quarter years and got his degree in March, 1939. His earlier practice at landscape sketching helped mightily, enabling him to do renderings and other free lance work part time during the academic year and full time during vacations. Working his way through college meant no janitorial jobs; it meant furthering himself in his chosen profession. Everything he did he turned to that same account.

This practical experience was gained in offices fairly close to home—in Minneapolis, St. Paul, and Eveleth, Minnesota; and in the St. Anthony Falls Hydraulic Laboratory at his University. It varied in kind from small homes to municipal buildings, from hospitals to power plants; and a good half of it was what even he calls engineering, rather than architectural, in nature.

In 1939, with a graduate scholarship to his credit, he entered Massachusetts Institute of Technology. After getting his Master's in 1940 at Cambridge he went back west again, but not home. For a year he instructed in the Department of Architecture at North Dakota Agricultural College, where he taught Sophomore Design, assisted in the other design courses, and had classes in freehand drawing, water color, history of furniture and interior decoration, and history of painting and sculpture. The architectural department was quite small. An instructor had to double in brass as well as possess lots of it.

Defense was the cry in 1940. Anybody who had his eyes and ears open knew we were in for a war ourselves. Besides, "defense" entailed lots of construction jobs if not lots of architecture. The combined appeal of patriotism and practicality was not lost on Francis Meisch. At the end of the school year he returned to St. Paul and went to work again at the drafting board, and debated with himself on the advisability of continuing teaching.

When a defense job in a part of the country he had never seen presented itself, Meisch decided to take it. As a draftsman for the firm of Shanley, Van Teylingen and Henningson, he went to Great Falls and West Yellowstone, Montana, and to Idaho Falls, Idaho. The job was concerned with the U. S. Army Winter Training Camp program, and, like many war projects, was terminated before it reached the construction stage. Next he went to work in Las Vegas, Nevada, for the McNeil Construction Company of Los Angeles, as a draftsman in their engineering unit. The job here was the design of contractor's facilities for a magnesium plant.

By this time 1942 had rolled along, Meisch began to feel the need of some permanent connection. He remembered the boost the first world war gave the automobile industry, and he looked around for a field which could expect the same stimulus from World War II, one whose ground-floor doors were still open. Aviation was, of

course, the answer. But Meisch wasn't satisfied with "aviation" in general; he took a long, hard look at aviation manufacturing and decided it was by no means as attractive as the business of commercial airline operation. Air transport had scraped along for years, with most airlines running on financial shoestrings. The war boomed them. He didn't see how their business could decrease after the war; by all the signs it should expand as only a few had previously dreamed it could. Manufacture of aircraft, on the other hand, would probably be a rather tough business once military contracts ceased. So, on the score of prospects, air transport was his choice.

What about the need for architectural services? Could he justify being an architect for an airline? He rather thought he could. He got a job in the engineering department of Northwest Airlines, whose home offices are in St. Paul. That was in February, 1942, and he has been plugging away excitedly at buildings and facilities for airlines ever since.

Ton-mile costs now roll glibly off the end of his tongue, to be translated, by the time they become pencil scratches on a luncheon tablecloth, into more efficient buildings—offices, terminals, overhaul shops, etc.—or airports, or headquarters, or any phase of aviation construction to which design talent can be applied. In ordinary times, "ever since 1942" would not be a very long period, but during an air war and in the aviation industry it is the equivalent of a normal decade. Meisch did not come by his familiarity with ton-mile rates without an intense apprenticeship.

In the course of his work for the airline he had as his first project the completion of, and installation of machinery and equipment in, a shop addition to Northwest's main overhaul hangar. There followed one project after another related to war contract construction: more shops, offices, restaurant facilities, and other work. A major job was the design and setting up of a large outdoor bomber modification center, complete even to utilities and equipment. This was in a terrific rush, and was handled by the Army's Corps of Engineers after development of the basic scheme. There was another, more complex modification center, set up by the airline, and there were hangars for the Air Transport Command.

Meisch's guess about the future of air transport seems confirmed by one phase of his current activities. Soon after the tremendous importance of military aviation was recognized, and larger, faster, more powerful planes were designed and built, all kinds of municipalities, from the largest to the smallest, began thinking and asking questions about expanding airports, building new airports, providing new administration buildings and the like, and getting and sustaining airline service. The Engineering Division of Northwest Airlines was flooded with requests for advice, opinions, information.

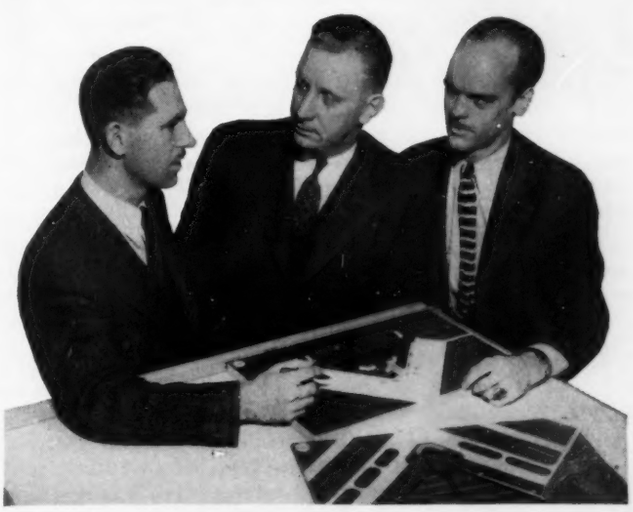
The Engineering Division began to get uncomfortable about the situation. They did not customarily wear turbans, nor did they peer into crystal balls. Their company was far too occupied with the day-to-day problems of running the business to give such requests the serious attention everybody realized they deserved. It became apparent that somebody had to do some research, and consequently the Engineering Department, in addition to being concerned with design and construction, found itself studying, analyzing, collating, drawing conclusions on postwar airport and airport building design problems. It had to be 'way ahead of the rest of its company's departments. Not only did it have to solve existing problems, it had also to anticipate the problems of the next few years, and find solutions for them.

That is progressive architecture indeed! Is it any wonder that Meisch is excited over it? Only twenty-nine, and with a bear by the tail—if he weren't a phlegmatic Minnesotan, the mere prospect would be his ruination. At times it must exasperate him to have to deal in today's stodgy realities. As it is, he works with a Plant Engineering Section to which he gives much credit, under a Chief Engineer and Chief Plant Engineer who apparently have high regard for his abilities. The majority of his company's airport and airport building problems and design are routed to Meisch.

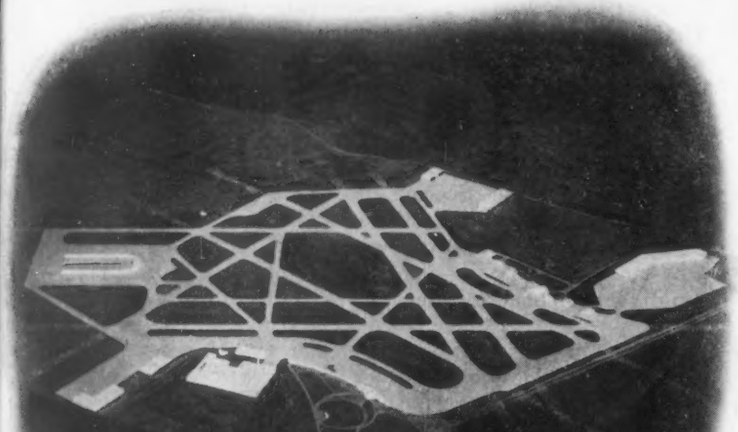
In 1942, the same year that he went to work for Northwest, Meisch married Elaine Hanson, interior decorator, whom he met working over a drafting table. His year-old son exhibits talents more destructive than constructive—a common enough failing at that age. As is common, too, in these days, his job cuts deeply into his personal life; in truth, he is more subject than most of us to absences from home. Expected and unexpected travel, much of it by air, often takes him away for days on end. If he finds spare time, he reads, paints, or sketches in water color, but he has to forego etching, an old love, because he has neither the time nor an etching press.

Francis Meisch's grandfather settled the family homestead, the four quarter-sections in southeast Minnesota where a younger Meisch spent his high school vacations. The original farmhouse and outbuildings stood in a river valley from which spread small wild canyons whose sides were steep, eroded bluffs. The stand of buildings has since been replaced by one farther back from the principal valley, closer to the more profitable farmland which the family accumulated as it prospered.

Some day Meisch hopes to build his own family a home on the fairly level top of one of the spurs between the finger-like ravines, above the site of the old homestead. The view up and down the valley is superb, he says; and the sunsets are gorgeous. He hopes he won't be so busy, so he can sit outdoors and paint, and smoke the pipe he prefers to the more convenient cigarette, while, perhaps, he discourses with a friend pleasantly, if rather earnestly, about the merits as students of young men from Middlewestern farms, young men to whom springhouses and barns and silos are architecture, to whom a ten-story building is a novel sight, to whom eggs and darts are henfruit and arrows. He found them pretty good material when he was teaching, 'way back before he got into that air transport game.



Meisch, Vernon Lundquist, Northwest's Chief Plant Engineer, and Richard Frahm, architectural designer, discuss an airport planning problem.



The model for Nashville's airport development shows the relation of the parallel-runway field layout to the airways station (center foreground), an aircraft plant (left of station), a cargo terminal (horseshoe-shaped structure), and National Guard and commercial facilities (aprons in background). Note, also, the car-to-plane driveway scheme.

Separation of functions on different levels is apparent in this sketch of the motor approach to the airways station. At the lower level is the service truck dock, with work space above. Private cars, buses, or taxis drive up directly to the main concourse entrance or turn to enter parking space near the plane stations.

Developed Under Supervision of

An Integrated, Long-Range Plan for the Nas

BY EDWIN A. KEEBLE*

THE WORK OF INTEGRATED AIRPORT PLANNING has dual characteristics: it is large-scale planning of the first order; yet, to serve its function properly and to keep pace with developments in planes and aviation in general, it must be absolutely as accurate in design, construction, and detail as a B-29. Obviously no one man could build a B-29. Numerous experts and functions are involved: engineers, aviators, production men, bankers, public agencies, and so on; all play their parts. Similarly, a successful solution to the highly complex problem of creating a great airport, used by various agencies and groups, demands the abilities of several individuals and specialists. The story told here shows how the architect's special abilities fit him for the job of master coordination in such multi-faceted planning.

Few realize the position in which badly planned airport facilities placed us at the beginning of the war. This must never happen again. Unless we are extremely vigilant, we are now in the last war in which our continent will remain unmolested. In the future, concentrated attacks by air can be met only with similar tactics. It is therefore criminal negligence, if not sabotage, to permit airports to grow like carbuncles, as most of them have in the past. And this applies quite as much to the development of our commercial air life lines as it does to ports designed partly or entirely for military use.

In this vital work, the architectural profession has both the opportunity and the ability to serve. Indeed, the challenge is too broad not to include in the scope of its solution all of the effort and skill which every interested agency and planning profession has to offer. Nor is this merely a theoretical proposal; experience already exists to show that, with a studied planning approach to the problem, the various agencies and groups cooperate to the fullest.

Background

The planning of Nashville's airport has been an active process for a number of years. The degree of intensity and the range ahead have varied, but the process has continued. It has graduated—slowly at first, abruptly under the impetus of war—from the old depression state when municipal authorities were unable, usually for financial reasons, to utilize longe-range professional planning.

In retrospect, it must be remembered, however, that men like WPA Director Col. Harry Berry (for whom the Nashville field is named) were "selling" airports to a very skeptical public. At that time plans were often spot decisions by public-agency engineers who were already exhausted by a multiplicity of detail on problems incidental to the gigantic relief effort. These men gave their best, but what could we expect from tired men "going from place to place, some weeks designing an airport a day"?

In at least one important respect, Nashville's record is more fortunate than that of most cities: careful study of the initial problem and a smart decision by the original airport committee, based on a full engineering report, resulted some ten years ago in the selection of an excellent site 4½ miles from the center of the city

* Formerly of the Nashville firm of Warfield and Keeble, Architects. At present Lieutenant with the U. S. Naval Reserve.

# of an "Airport Architect"

Nashville, Tennessee, Airport

The development of the port itself, however, while not exactly haphazard, progressed in a typically uncontrolled manner. Each of the several interested groups went ahead more or less intelligently, but independently, without benefit of coordination or agreement on common long-range objectives. When in 1939 a plan was suggested to provide future multiple runways for possible military needs, it should really have come as no surprise to receive the reply that we did: "This is no military airport. The Army can build its own airports." All Nashville was aroused when the Army concluded that further development of the airport for army use would be uneconomical. Everyone wanted to know why.

Action

From that day on, the story of the port's development has been logical, swift, and coordinated. The citizenry has firmly backed Nashville's aviation-conscious Mayor, Thomas L. Cummings, in his efforts to get to the bottom of the problem in an orderly and systematic way. The results have been unique and interesting.

The first move was the employment of an Airport Architect! Tennessee's progressive Bureau of Aeronautics agreed to provide funds for the initial work. Then followed an outstanding coordinated effort.

In the work, the following were involved: the City of Nashville, Davidson County and Tennessee State Highway Departments, the Army Air Corps, American and Eastern Airlines, the Tennessee National Guard, Consolidated Vultee Aircraft Corporation, the City and County Planning Commission, TVA power lines, many interested land owners, and hundreds of private flyers. With the facilities that existed before the coordinated program was set up, no one of these could undertake alone a detailed study of every problem involved, give the day-to-day attention required for a sensible solution, or persuade other groups or individuals to fall in line.

The first big job undertaken by the airport architect, with the aid of the City and County Planning Engineer, Charles Hawkins, and his staff, was to prepare data to prove to the Army that there was no better place in the area than Nashville for the development of a first-class airport.

From this, developmental plans were prepared showing a future field with a traffic capacity substantially in excess of existing fields in America's largest metropolitan areas. Drawings of outstanding airports were reproduced at the same scale as the Nashville drawings to demonstrate relative possibilities.

When the Army Colonel in charge said: "Let's get practical about this thing," he was perhaps surprised to be presented not only with detailed estimates based on a TVA, WPA, Vultee, joint-sponsored contour map, but unit costs from the latest experience of the District Engineer's office, plus a statement from the Mayor that the City was ready to buy the additional land as necessary.

Results to Date

The project went ahead. Many a diplomatic campaign was conducted to keep the parallel runways parallel and to prevent buildings from being built on space assigned to future runways. The Air Transport Command units stationed at the field, the U. S. Engineers supervising the work, the management of Consolidated Vultee, etc., joined forces to "hold the fort."

Meanwhile, the City authorized the architect to prepare preliminary developmental plans for the airways station as well as the field. By now everyone understood that these elements were as inseparable as is the wing from a plane. The Civil Aeronautics Authority rendered its usual indispensable cooperation and assistance relative to field standards and layout. The airlines, through their research departments, aided substantially in the solution of both field and station problems.

While preliminary plans are now fully developed, exact space uses and adjustments are still in the process of study. Changes will be made, of course; but the project will be kept alive and ready for the day when it can go forward smoothly, rather than as a last-minute conception based on high-point surveys, high-pressure decisions, and mediocre compromises. Nashville not only intends to achieve one of the world's most appropriate airports, but to eliminate the waste of public funds inevitably involved in haphazard, nonintegrated, or superficial planning.

Planning Principles

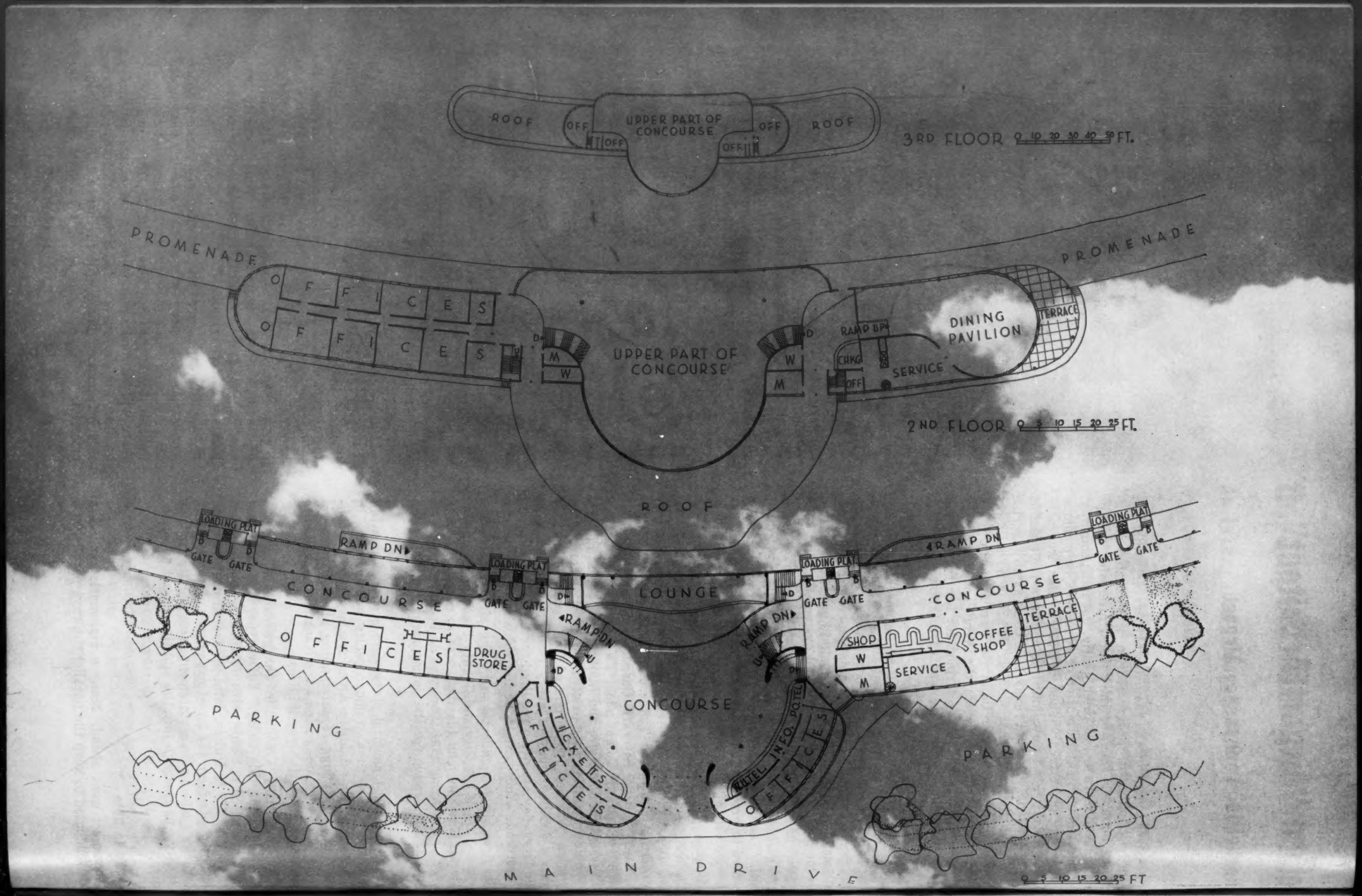
If any one guiding principle may be said to underlie the total concept of Berry Field's development, it is the importance of holding transit time to a minimum. Regard for the comfort and convenience of air travelers, so often compromised in airport schemes, has resulted in a coordinated effort at every level.

As already mentioned, the site was fortunately selected at a convenient distance from downtown Nashville. To implement this advantage, a four-lane State highway, with center grass plots and grade separations at busy crossings, has been built from the city limits direct to the port; another highway installed by the County joins the port and the largest residential area, and blueprints are ready—and funds available—for a City boulevard to connect the State highway with the center of the city proper.

Every effort is being made to insure for all time that a trip to the airport will not exceed ten minutes. This in itself, however, is only part of the problem. Unless the airport station is also planned to minimize time, the advantage gained by swift travel from city to port can be seriously jeopardized. Thus, in the projected design for the terminal building, the comfort and convenience of the passengers—easy transfer from plane to car, bus, or cab, and vice versa—have been the reference points used throughout.

For private cars, there will be *adequate* parking space so arranged that persons meeting or seeing passengers off may park close to a particular plane station. To indicate the way to Stations 8, 12, 15, 19, or whatever, there will be road markers along the access driveways guiding the driver into the proper channel. A curbside information booth will further aid the incoming motorist.

(Continued on page 66)


ROOF
OFF
UPPER PART OF CONCOURSE
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OFF
ROOF
3RD FLOOR 0 10 20 30 40 50 FT.
PROMENADE
PROMENADE
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OFFICES
M
W
UPPER PART OF CONCOURSE
W
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RAMP UP
CHKG
OFF
SERVICE
DINING PAVILION
TERRACE
2ND FLOOR 0 5 10 15 20 25 FT.
ROOF
LOADING PLAT
GATE
GATE
RAMP DN
CONCOURSE
OFFICES
DRUG STORE
LOADING PLAT
GATE
GATE
LOUNGE
RAMP DN
RAMP DN
CONCOURSE
PARKING
TICKETS
OFFICES
CONCOURSE
HOTEL INFO.
OFFICES
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MAIN DRIVE
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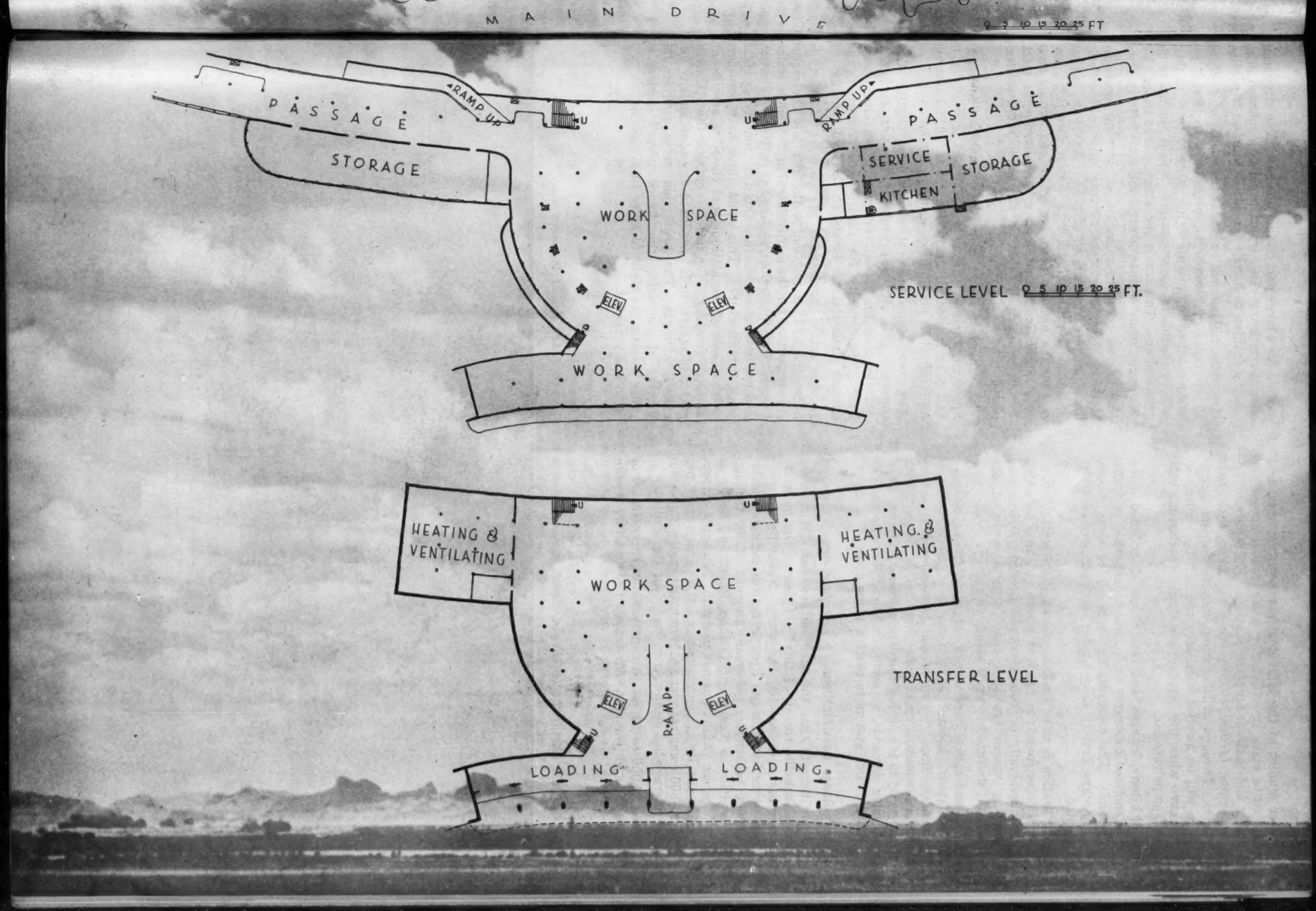

MAIN DRIVE
0 5 10 15 20 25 FT
PASSAGE
RAMP UP
RAMP UP
PASSAGE
STORAGE
SERVICE
STORAGE
KITCHEN
WORK SPACE
ELEV
ELEV
WORK SPACE
SERVICE LEVEL 0 5 10 15 20 25 FT.
HEATING & VENTILATING
HEATING & VENTILATING
WORK SPACE
ELEV
ELEV
RAMP
LOADING
LOADING
TRANSFER LEVEL

Later studies of the individual plane-station entrances and exits make provision for unobstructed access for buses and taxis to all plane stations. Each pair of access gates is designed to serve not more than four planes. Through collaboration with the airlines, baggage will be handled only once and will be waiting at the curb when the arriving passenger reaches his cab, bus, or private car.

Snack bars, lounges, and rest rooms, distributed along the enclosed concourse ramp, will be extended as traffic demands. The main dining room, coffee shop, movie, drug store, novelty shop, barber shop, etc., are centrally located.

The station is to be built in stages. Each unit, such as the dining room, reservations offices, etc., may be added to individually or collectively as needed. Drives and parking spaces are of course integral parts of the scheme, designed to grow along with it.

Mail and express are wholly separated from passenger circulation. Located on a lower level, along with incidental offices, the space will be arranged to accommodate standard small motor vehicles, if desired, with ramps up to the field at the various plane stations. When occasion demands, an ambulance or diplomatic car can use the same system to reach a plane door.

Long-Range Considerations

From time to time the question is asked, "What need has Nashville for all of this?" A few of the more interesting statistics tell the story. Nashville's airport has never lost money. Prewar figures indicated about 600,000 passengers per year into, out of, or through such cities as New York, London, Paris, and Berlin at their peaks. Airline planes using the Nashville airport had a capacity of approximately 400,000 passengers per year. 500 complete plane movements per day was a 60-day average before the Army took over the airport.

Some 25,000 to 30,000 persons per day enter, leave, or pass through the city. Air transport is making a serious bid for a large part of this business. The city should continue to grow. Its airport could be expanded in an orderly fashion to handle the entire number if need be.

Meantime, full use will be made of the existing facilities by all types of commercial planes. "Air Parks" are being planned for private flying. One or more of these will be capable of expansion into a field similar to the principal one. This would also absorb cargo traffic when passenger requirements demand full use of Berry Field.

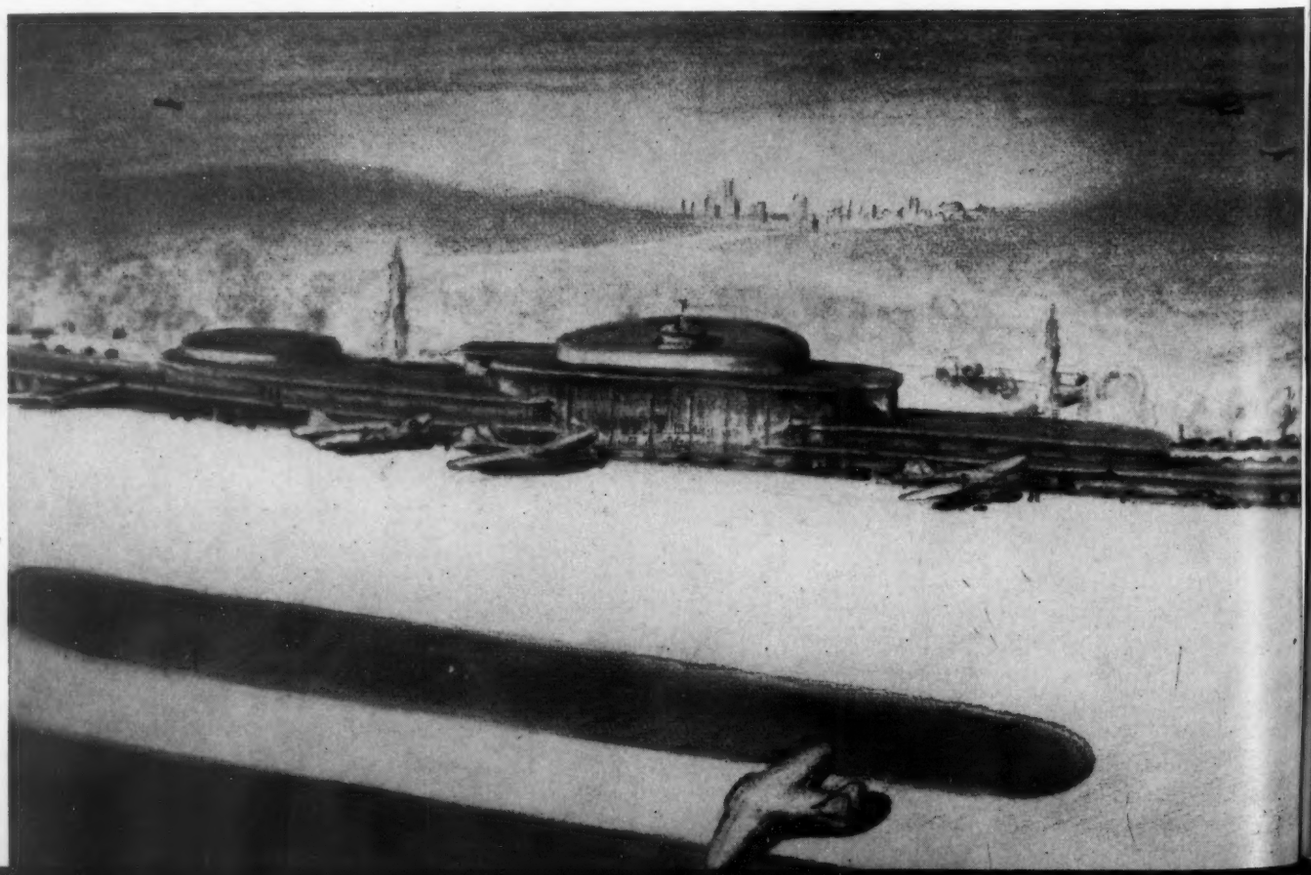
Nor has an accurate valuation of growing air center activities been overlooked. Every city is frantically drawing its cart wheel of airlines. Nashville had one in 1931. It projected lines in eleven directions, connecting the nation's most important commercial areas by straight lines crossing at a logical refueling point. Ten have been operated or are immediately contemplated.

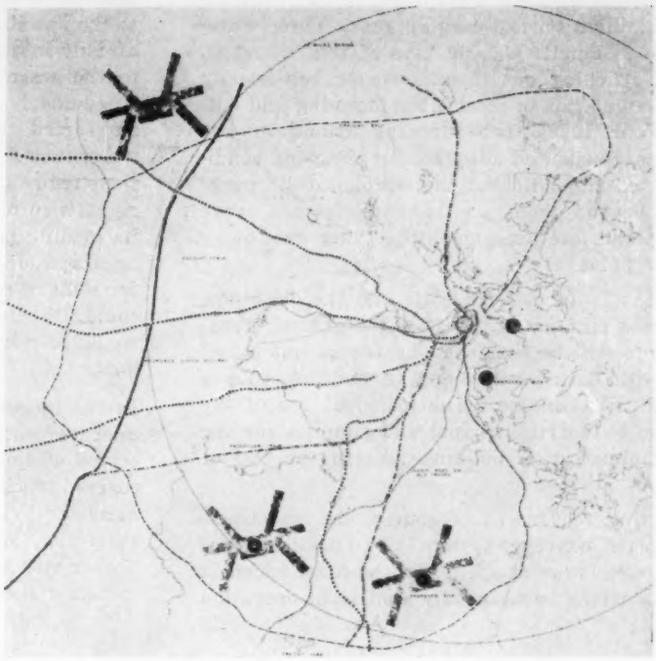
The runways are now more than 5,000 feet in length. Space for their extension to 7,500 feet is available, if and when needed. Ultimate lengths of 10,000 feet will be retained as possibilities in the scheme.

Along such lines the problem has been studied. Consequently this city was probably the first to have a definite plan for its airport which provided enough field traffic capacity for future needs combined with enough plane stations to absorb the field capacity.

In this entire development of the Nashville port, its buildings, and its relation to the city and the region, it is important for the architectural profession to realize the part that the architect played as master coordinator, and the new dimension that this function brings to the word "architecture." This could never have been done on the basis of the attitude that classifies architecture as mere frosting. Nor has the opinion that "there is no 'architecture' to it" produced any spectacularly successful airports. The profession must complete the process of correcting the "ivory tower" ideology in order to earn the right to serve in a capacity where it is so badly needed.

On the field side of the building are multiple plane-station entrances at either side of the main block





Boston was chosen by the designers as a good location for a terminal cargo airport because of its industrial importance, its future air cargo expectancy (estimated at a million tons annually), and its favorable geographic position, 200 miles nearer Europe than any other large American port. The site first selected was the Old Harbor district near rail yards, ship docks, and business center. For various reasons this was abandoned, however, and three outlying sites were selected as preferable alternates. These are about 15 miles from the center of town, suitable land is available, and they are near existing highways and railroads. A possible future railroad freight belt, proposed by Dr. Martin Wagner, would also pass near each.

PROJECT FOR AN AIR CARGO TERMINAL

Jorge Gonzalez-Reyna and Yusuf Meer, Designers

Two advanced students in the Graduate School of Design at Harvard University, Jorge Gonzalez-Reyna of Mexico, and Yusuf Meer of Iraq, while working early last spring on their problem of designing a Cargo Air Terminal for Boston, evolved a highly ingenious system for the efficient handling of air cargo from plane to warehouse to truck and vice versa. Since the rate at which commercial air cargo flying can develop in future depends greatly upon costs, any study of the problem of rapid, large-scale transshipment from plane to ground transportation at the airport is worth while as an attempt at reducing costs. The scheme presented here has already aroused some interest among officials and engineers of one of the leading air lines, and the two designers have applied for patents covering a number of original mechanical features incorporated in their design.

The future of air cargo flying is considered by many aviation authorities to be a highly promising one, with tremendous possibilities for expansion. From small beginnings a decade or more ago in this country, the air express business has grown rapidly and steadily until in 1942 almost 12 million ton-miles were flown. This much was accomplished using the facilities of the regular commercial airlines' systems, with airports designed primarily for handling passenger business. During this period, costs per ton-mile have been steadily reduced, indicating that as further progress is made after the war, more and more articles of commerce can be profitably shipped by air. Much study has already been given to the possibilities of long-distance shipment of fruits and produce. Savings resulting from the elimination, through high-speed transportation, of spoilage in such perishable goods as strawberries and lettuce, may soon be great enough to overcome the difference between rail or truck rates and those of air carriers. When that point is reached, there will be an increasing need for airports and terminals especially designed to handle this type of business.

This particular air terminal design (shown in plan on the following page) was laid out to provide ideal conditions

for handling one million tons of cargo a year. Three warehouses, each able to handle 400,000 tons of this, stand on the large apron, reaching out their conveyor belt-loading mechanisms like huge arms to receive the incoming and outgoing planes. Four 10,000-foot runways extend in two compass directions, considered adequate for the wind conditions at the selected site. Behind the warehouse lie parking spaces, and beyond them are hangars for the large planes. Feeder planes are presumed to be taken care of by hangars on other fields.

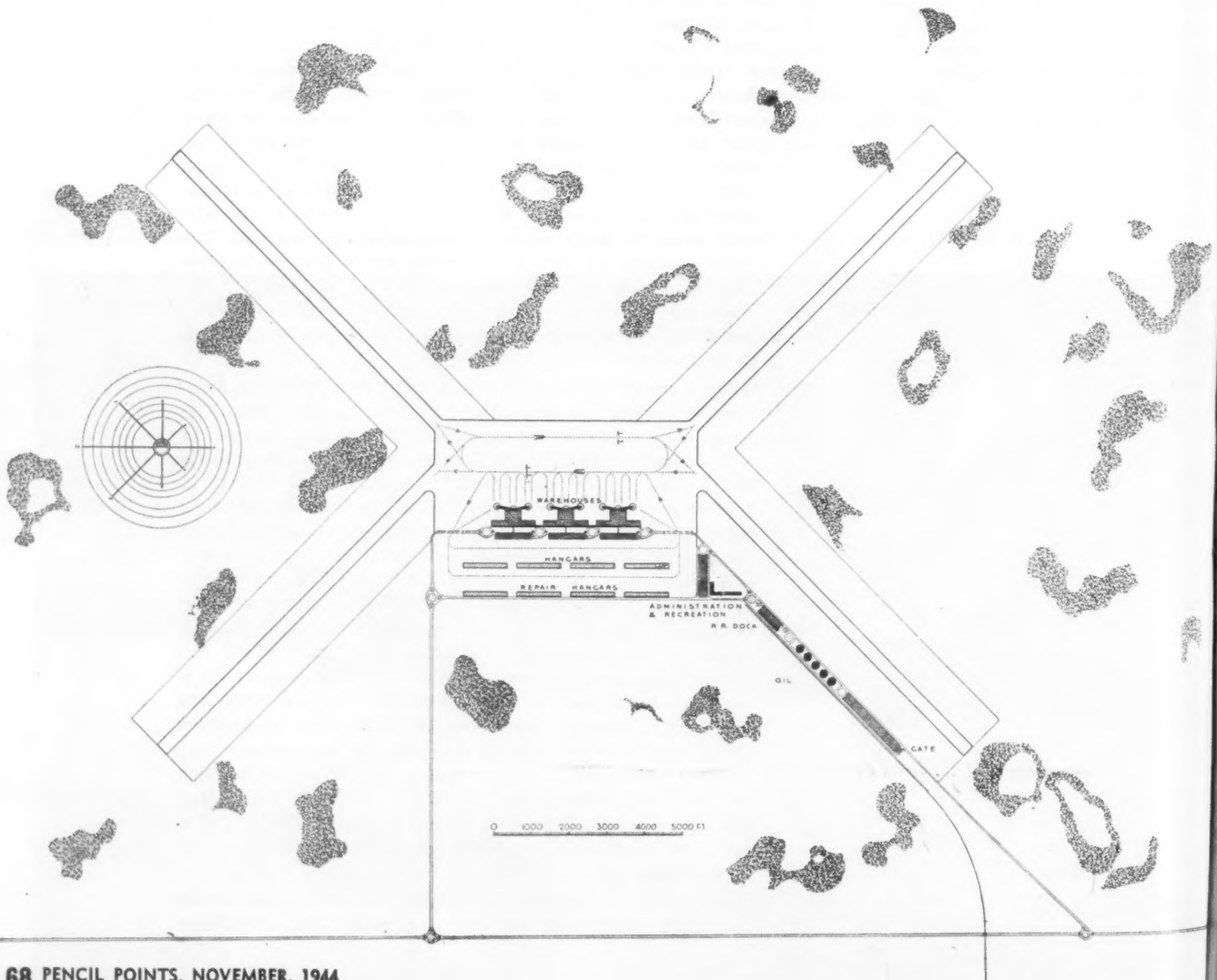
Ground circulation of planes is indicated on the drawings. Crossings have been eliminated. Most of the ground transportation for cargo will be furnished by trucks but a rail spur, equipped with docks, will bring in and take out a small part of the total volume. The principal use of the railroad, however, is to bring in fuel and supplies for the hangars. An administration building adjoins the end of the railroad line.

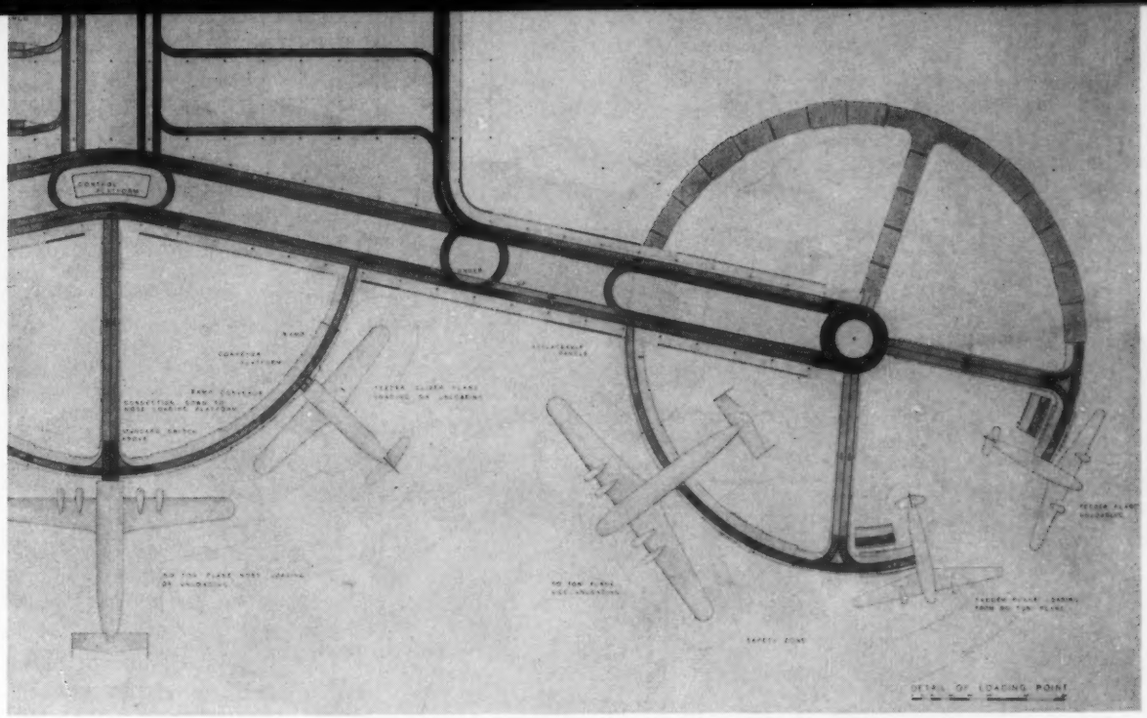
The most interesting feature is, of course, the warehouse design, with its special conveyor system. Two possible types of airport warehouses were studied. In the first, which is not illustrated but which is essentially similar in operation to the one shown, no cargo has to be crated. The packages, already in standard size crates, would be brought by truck to the warehouse a reasonably safe time ahead of their scheduled departure by plane. After being properly recorded and sorted, they would be stored for but a short time on the warehouse floor in preassembled rows according to destination, ready to be quickly put on the conveyor belt at the right time to synchronize with the arrival of the plane at its loading point. Cargo arriving by plane would likewise be stored for only a short time before being loaded on trucks for delivery. The storage area of this type of warehouse could therefore be somewhat smaller and the operations would be relatively simple. Both types would have an adequate cold storage room.

In the larger type, plans of which are shown on page 72, uncrated packages from a number of sources would be received at the warehouse from trucks, picked up along the covered trucking platform by a cargo train of tractor-drawn hand trucks, and transferred to the receiving belt. After recording, sorting, and crating, they would be taken to the proper storage space or to the loading point of the conveyor system and thence to the waiting planes.

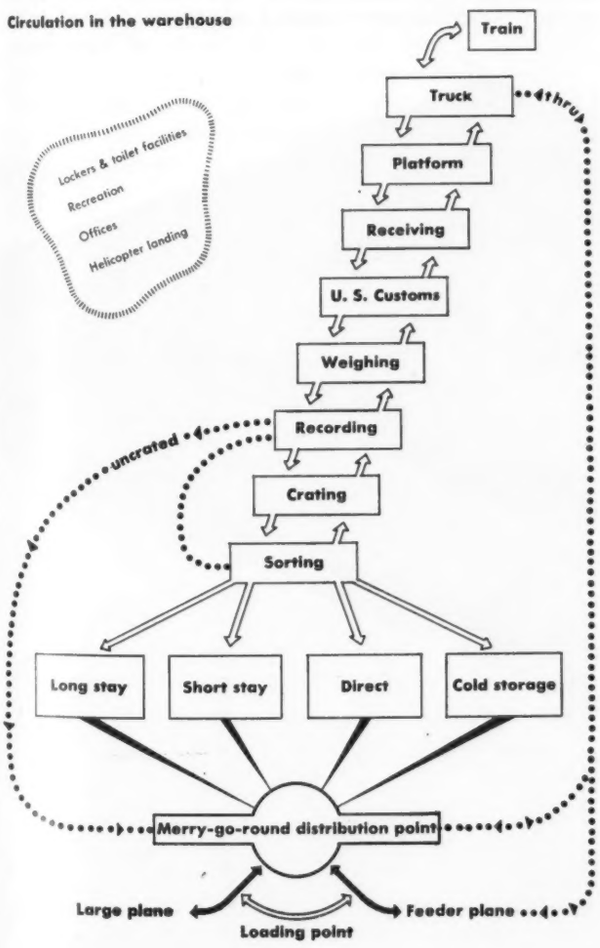
CARGO AIRPORT

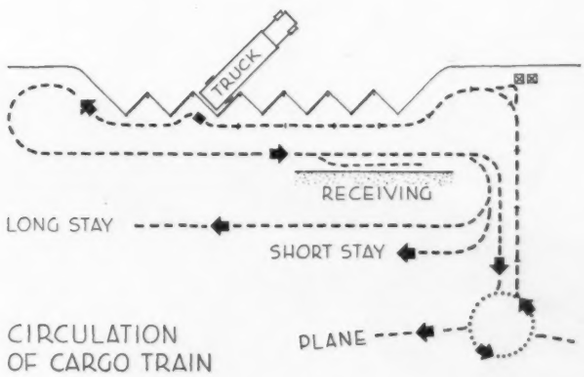
Plan of the proposed cargo air terminal designed to increase speed of transshipment between planes and surface carriers, thereby reducing ton-mile cost from origin to destination and tending to increase volume of traffic handled.

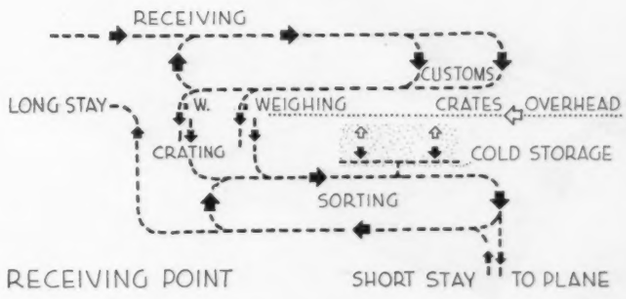


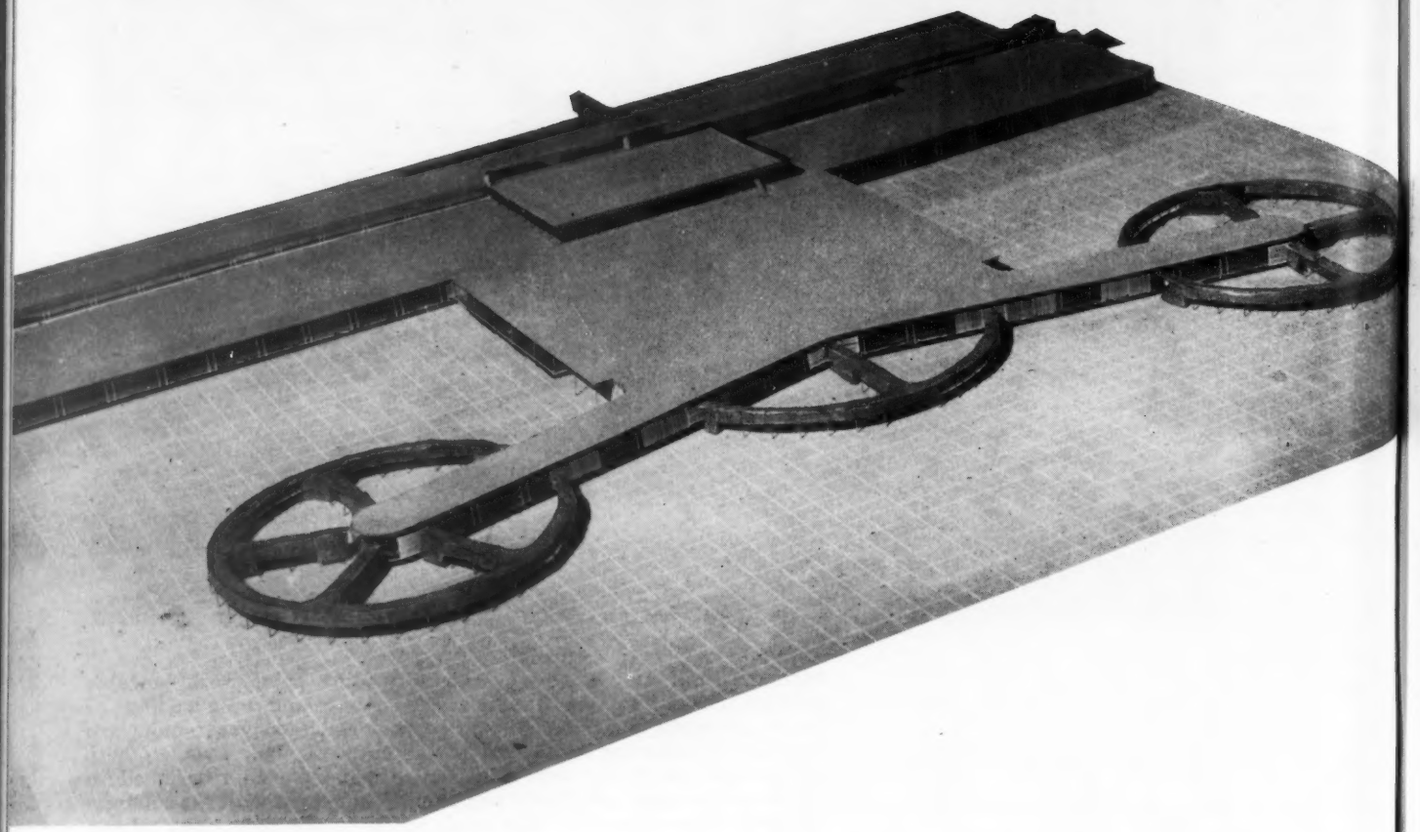


Plan of detail of conveyor system at loading point, with portable sections permitting simultaneous side-loading and nose-loading of large and small planes. Note that some portable conveyor units are arranged to telescope together to permit entry of planes, while others are moved out of the way. The entire belt system is designed to circulate the cargo selectively and rapidly in accord with the analysis charted below at the left. The small charts in the right hand column show diagramatically the movement of cargo through the warehouse, the lower one being a detail of operations taking place at or near the receiving point.

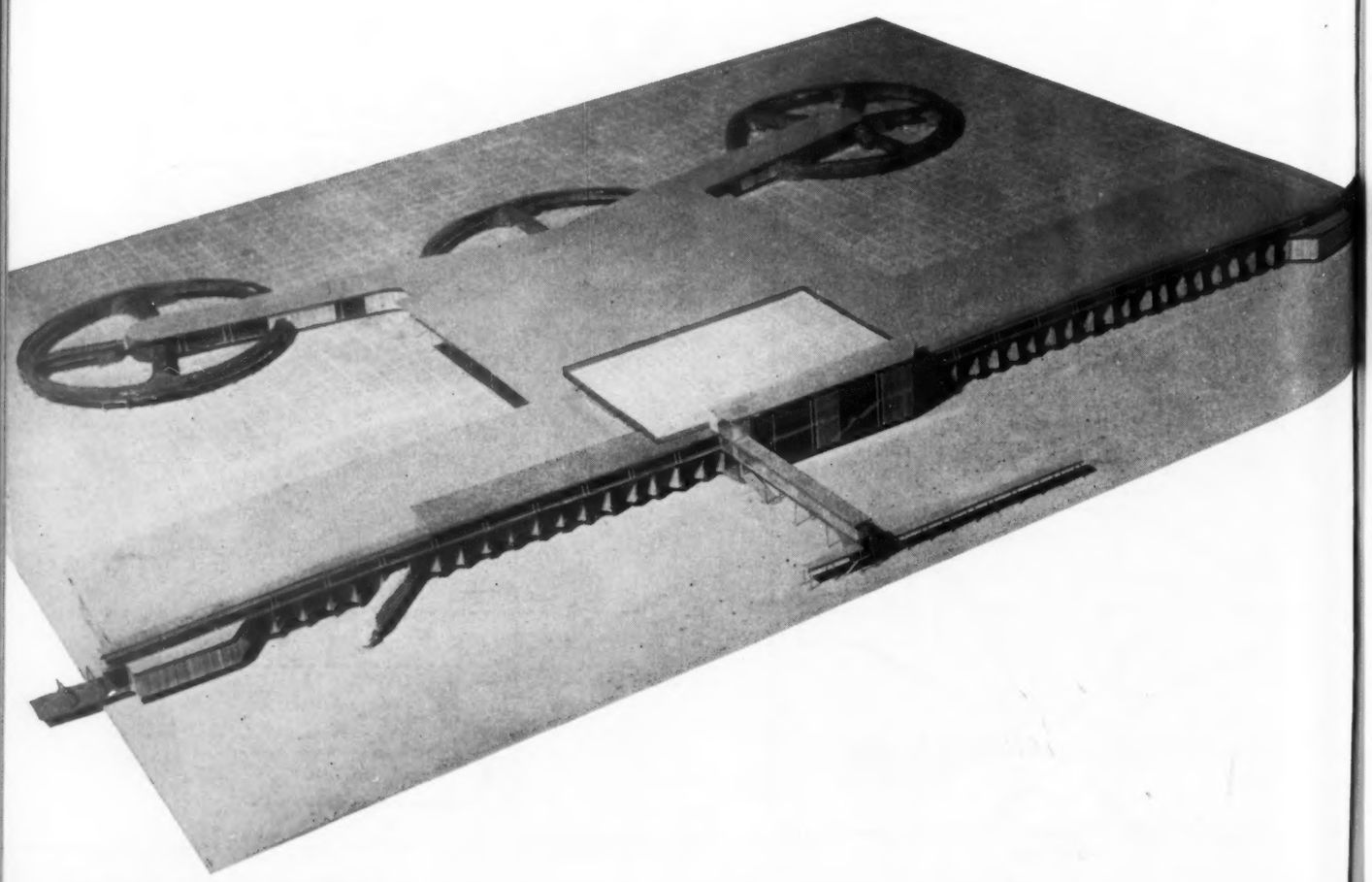








A scale model of the warehouse shows clearly the disposition of the several parts of the scheme. A flat roof was chosen as being simpler in construction, easy to maintain, and better for temperature control. Lighting inside is to be artificial, employing cold cathode tubes. Office space, together with lockers and other employee facilities for four shifts, are in the (comparatively) small superstructure which has a helicopter landing platform for its roof to take care of possible small shipments, mail, and whatever personnel may be flown in and out by this method. The side of the warehouse away from the field is arranged to accommodate standard motor trucks for loading and unloading. An overpass permits circulation between the office floor and the parking space without crossing the path of trucks.

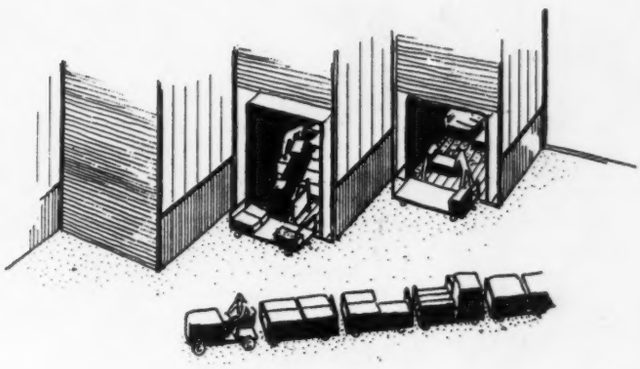


Shipments are to be handled from the belt conveyor to the motor truck loading stations or to the different parts of the warehouse for storage by means of conveniently sized hand trucks which can be assembled into trains drawn by electric tractors.

UNLOADING CARGO TRAIN

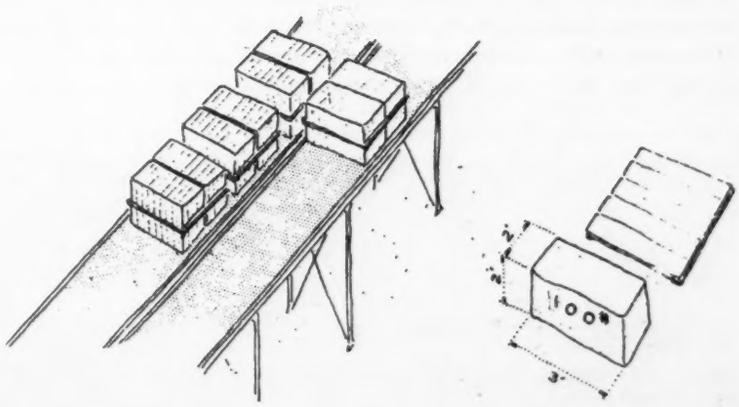
CARGO AIRPORT

A cargo train, shown arriving at the truck loading platform where shipments may be properly distributed to the receiving vehicles or picked up to be handled into the warehouse, recorded, assembled into plane cargoes, and eventually put on a conveyor line which takes them to the proper planes.

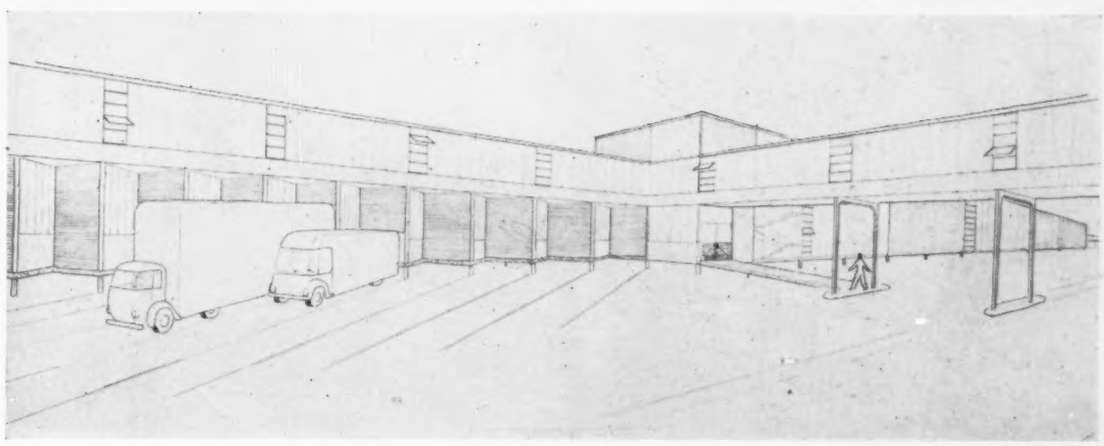


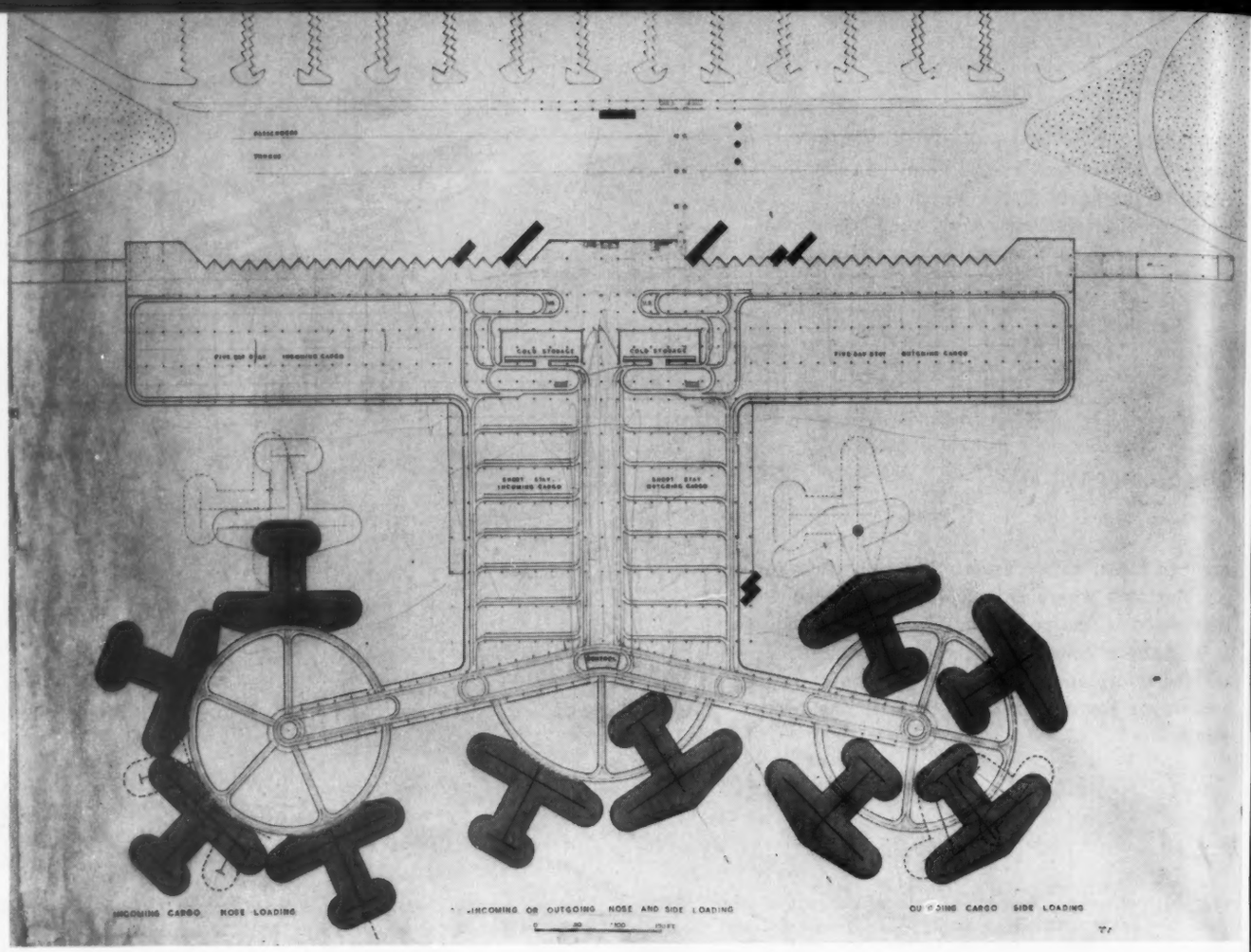
UNLOADING TRUCK

The system would work best, its designers feel, if some sort of standard crate were adopted for convenient handling all along the line. These should be about 3'x 2'x 2' and should contain, on the average, about 100 pounds. Wire mesh is recommended as the crate material because it is light and flexible.

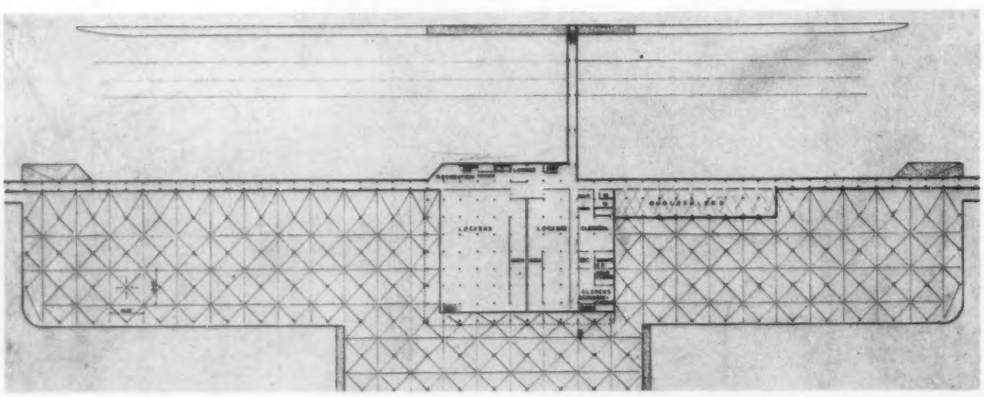


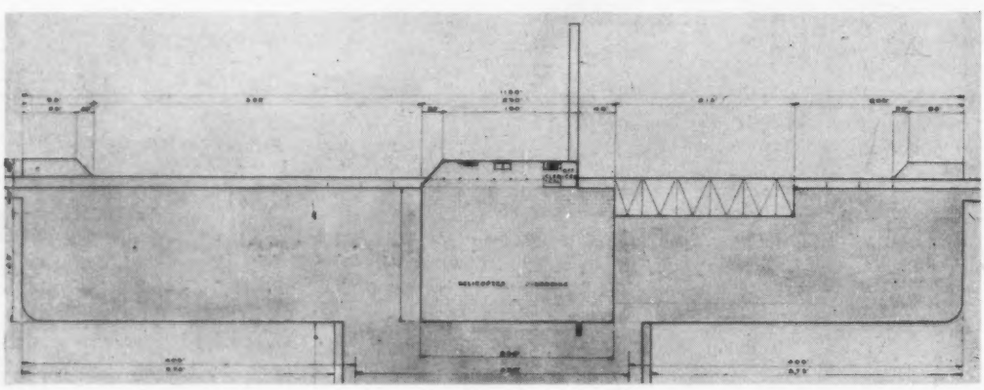
Outside the warehouse, trucks can back easily into position for loading or unloading at their designated stations along the zigzag face of the building. This arrangement increases maneuverability of trucks and avoids traffic difficulties.





Organization of the warehouse is shown on these plans. The conveyor belts were calculated to carry a 10- to 12-ton load, the expected capacity of the large plane (or 65% of its total 15-ton payload). When a plane arrives at the loading point, the pre-assembled cargo row is set moving on the conveyor at a speed of 150 feet a minute so that it will reach the plane in less than five minutes. This, according to the designers, makes it possible to load the plane within twenty minutes.





This article, designed to acquaint the airport architect with the fundamentals of airport operating and control systems, was prepared with the cooperation of Westinghouse Electric & Manufacturing Company engineers. The typical lighting plan shown on Page 74 was produced with the assistance of the New York Regional Office of CAA. All other drawings and photographs are from Westinghouse.

Airport Equipment

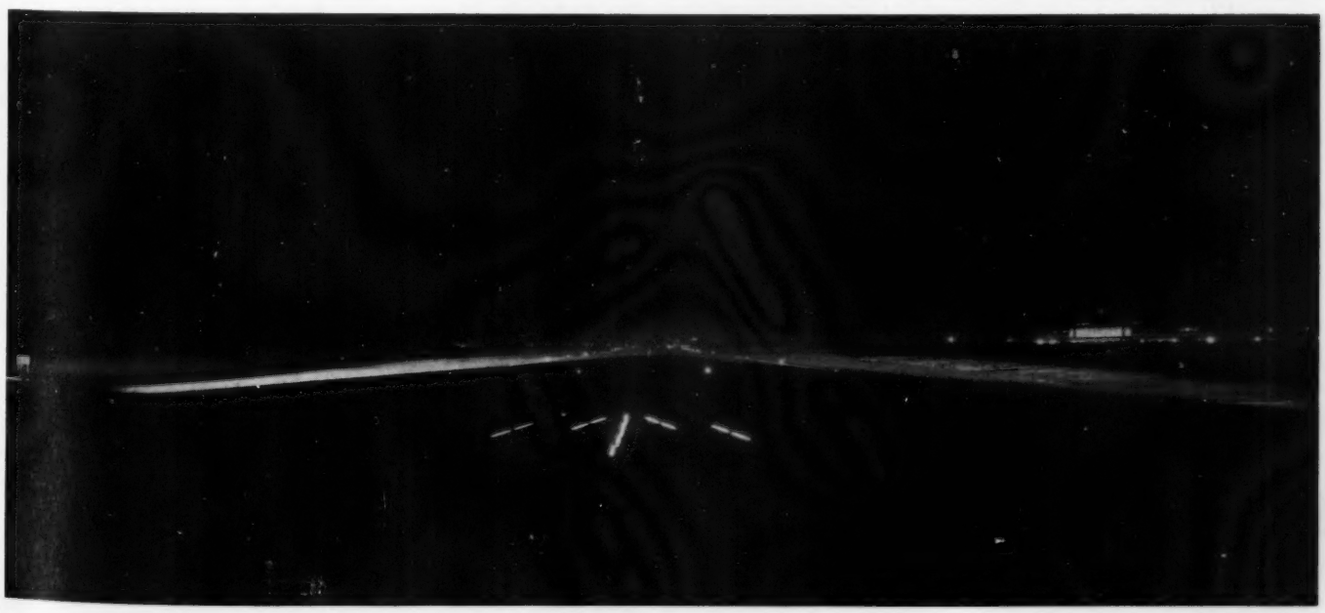
A PRIMER FOR THE ARCHITECT

In the postwar years, night flying is sure to increase as present flight schedules are enlarged and long-distance flights become more frequent. Obviously, proper lighting of airfields is a sine qua non for the successful handling of this new traffic.

In his capacity as the coordinator of the various elements that make up an airport design, the airport architect needs at least a bowing acquaintance with the subject. True, few architects will actually design a port's lighting installation or lay out the wiring system—jobs that require the specialized skill of engineer experts. But a knowledge of the various types of lighting for different classes of airports, plus some basic specific data, will not only give the airport architect a better appreciation of the work of one of his most important collaborators, but may also affect judgments as to location of airport structures, design of the buildings themselves, or arrangement of specific facilities within the buildings.

Determination of the amount, type, and complexity of an installation—general airfield lighting, boundary and runway lighting, other types of navigation aids and outside lighting connected with airport structures—is a problem to which a separate solution must be found in each instance.

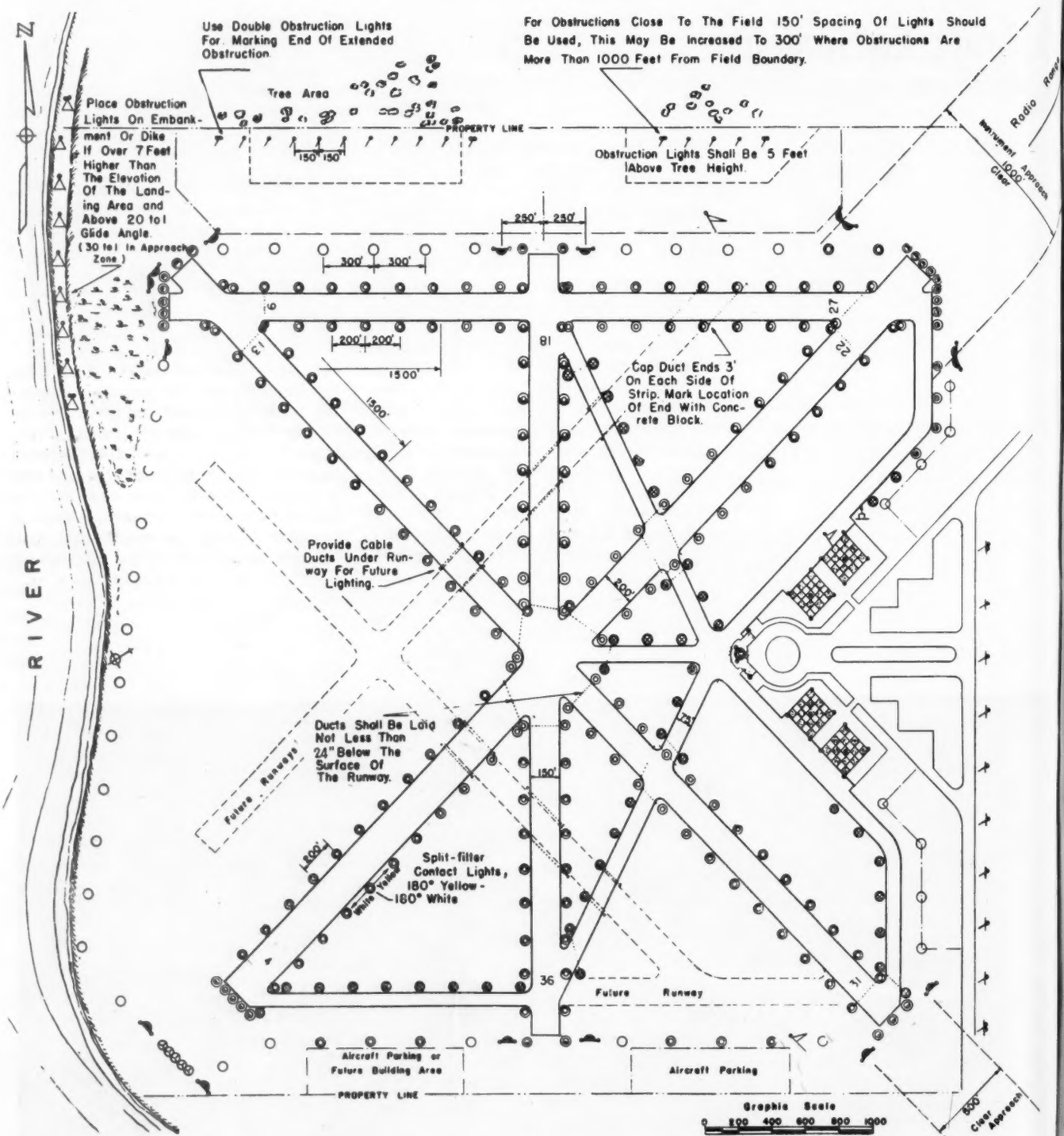
Size, class and use-type of port, local topography, and the nature of existing buildings or natural obstructions in the vicinity are all limiting factors. For example, an airport located in open country may not require any warning lights to mark obstructions adjoining the port, whereas a field in or near a built-up community will require an elaborate installation of



Airport Lighting Composite Plan

NOTE: This plan, designed to indicate a variety of typical airport lighting problems and solutions, is schematic rather than illustrative of a particular installation.

- Boundary Light (White)
- Flush Boundary or Contact Light (White)
- Flood Light With Obstr. Lights
- Flush, Two Color Split Filter (White – Yellow)
- Flush Contact Light (Yellow)
- Flush Taxi Guidance Light (Blue)
- Flush Range Light (Green)
- YELLOW AUXILIARY Range Lights
- Red Obstruction Light
- Red Obstruction Light – Cone Mounted
- Red Obstruction Light on Pole
- Double Obstruction Light (Red)
- Revolving Beacon (Green and White)
- Code Beacon
- Wind Tee Lighted
- Wind Cone
- Ceiling Projector (1000' From Observation Point)


N
Use Double Obstruction Lights For Marking End Of Extended Obstruction
For Obstructions Close To The Field 150' Spacing Of Lights Should Be Used, This May Be Increased To 300' Where Obstructions Are More Than 1000 Feet From Field Boundary.
Tree Area
PROPERTY LINE
150' 150'
Obstruction Lights Shall Be 5 Feet Above Tree Height.
Radio Range
Instrument Approach 1000' Clear
Place Obstruction Lights On Embankment Or Dike If Over 7 Feet Higher Than The Elevation Of The Landing Area and Above 20 to 1 Glide Angle. (30 to 1 In Approach Zone)
250' 250'
300' 300'
200' 200'
1500'
1500'
13
81
27
22
Cap Duct Ends 3' On Each Side Of Strip. Mark Location Of End With Concrete Block.
Provide Cable Ducts Under Runway For Future Lighting.
RIVER
Ducts Shall Be Laid Not Less Than 24" Below The Surface Of The Runway.
Future Runways
150'
300'
Split-filter Contact Lights, 180° Yellow – 180° White
White
Yellow
36
31
Future Runway
Aircraft Parking or Future Building Area
Aircraft Parking
PROPERTY LINE
Graphic Scale
0 200 400 600 800 1000
500' Clear Approach

obstruction lights. Even the weather will affect the type of installation.

For airports in northern areas subject to heavy snowfall, where the snow may obscure ground lighting, supplementary above-ground units such as runway floodlights are a wise precaution. Another reason why fixed standards or rules are impracticable is that technological advance in types of planes, aviation practices, or lighting equipment itself brings frequent revision of practice, and what is standard today may be obsolete tomorrow. Range of types of lighting installation extends from a simple system with lights outlining the boundaries of the entire usable area (or of the runways) to systems for major air terminals that normally will require an elaborate installation including beacon, range, contact, boundary and obstruction, flood, and apron lights, etc.

Luckily, engineers and architects have the invaluable resource of the Civil Aeronautics Administration to turn to for guidance, current standards, consultation, and advice. Furthermore, manufacturers of airport lighting equipment have integrated their products to meet CAA standards; and the airport architect finds himself in the rare situation of working on a problem wherein the needs are either well known or constantly being kept up to date, and the means of serving these needs are available in the most efficient form that modern technology allows. It is an excellent instance of the government agency, the private manufacturer, and the creative designer all assuming their joint responsibility in furthering architectural progress.

Categories of Airport Lighting

Airport lighting has three fundamental jobs to do:

1. Provide pilots with a clear identification of the airport.
2. Define field or runway areas to assist pilots in both landings and take-offs.
3. Warn against obstructions and control field traffic.

In describing the different standard lighting units for airport use, it must be kept in mind that under war limitations certain ones of these are not currently available. In fact, for wartime airport lighting, CAA in conjunction with the Army is limited to bare essentials, omitting several desirable, but not absolutely vital, refinements. Our discussion, however, is concerned with optimum facilities for the postwar port, and we list and describe the full range of units which will probably be in use when war restrictions end.

The typical airport lighting plan shown here is a composite drawing made up from pre-war CAA standards, plus a few improvements in practices which have since become standard. The plan is, of course, diagrammatic rather than typical of any specific condition in order to indicate use of a wide variety of facilities.

The "recommended minimum facilities" shown in tabular form on Page 84 are taken from CAA's "Airport Design," published in April of this year (available from the Superintendent of Documents, Washington 25, D. C., for 25 cents).

Lighting for the Identification of Airports

To give the nighttime pilot unmistakable indication of an airport's location, a high-mounted, rotating, searchlight-type beacon ⊙ is recommended for all classes of airports.

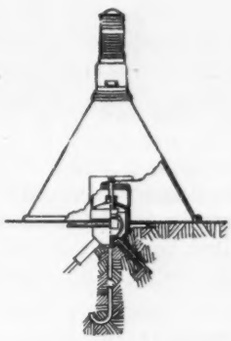
This type of beacon has a lens at each end of the drum unit—one clear, the

other green—providing an alternating color flash visible in the angle of approach from a considerable distance. At large airports, installation is usually at the top of the control tower. In other instances it may be mounted on a specially designed tower (not less than 50 feet in height) or on a prominent topographic feature.

In addition (subject to the type of port), it may be necessary to supplement the rotating beacon with an auxiliary beacon that flashes a two-letter identifying code signal in International Morse code. ⊙

Lighting that Assists Landings and Take-Offs

Boundary Lights. To define the limits of the usable field area, a system of boundary light units is recommended for all classes of ports other than purely strip-type fields.



Spaced approximately 300 feet on centers, they fall into one of two categories:

1. The more usual type is a unit mounted on a steel cone, ○ with clear prismatic globe at the top, bringing the light itself about 3 feet above grade.
2. A clear-lens unit that is flush-mounted, ⊙ *(Revised symbol)* employed where the lights adjoin a parking space or other place where cones would constitute dangerous obstructions.

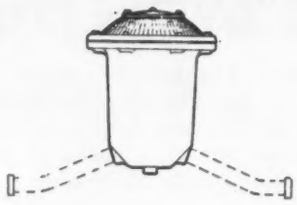
Range Lights. Designed for use on all-way fields, these units have green prismatic globes and are located at the ends of runways to inform the pilot of the best landing direction. Usual practice is to code each runway: that is, if 2 range lights occur at one end of a runway, 2 occur also at the opposite end of the same runway; for another runway, there will be 3 range lights at each end, etc. Runway coding is not essential, however, where a runway contact light system (see below) is used.

As a rule, the use of range lights is limited to fields having an all-night operator to control them; in some instances, however, range lights are installed in the boundary circuit and they all remain on all night.

Otherwise, a full boundary system or complete runway marker system is used.

The preferred type of range light is a flush-mounted unit ● (just below grade). These units are installed ex-

Symbols shown in the text are recommended by the Civil Aeronautics Administration. Drawings and photos indicate physical appearance.

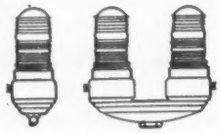


actly at the ends of runways, as shown in the typical layout.

A cone-mounted unit ◑ is used and may be necessary in cold climates where flush units would frequently be obscured by either falling or blowing snow. If used, these are installed beyond the end of the runway, in the field boundary light system.

For use where the field boundary is more than 300 feet from the end of the runway an auxiliary yellow cone-type range light ⊕ is used (see condition at Runway 4 on typical layout). These are installed at whatever usable distance exists between the end of the runway and the field boundary.

Obstruction Lights. Wherever obstructions occur in the vicinity of the field, warning lights are installed on a level with or slightly above the obstruction to be marked. A survey of the port site will determine the number required. The CAA general recommendation is that all local obstructions "higher than 1/20 the distance from the field boundary should be removed wherever possible. If these occur in the approach zone to the runway, the ratio of 1/30 applies; for the instrument runway, 1/40. When such obstructions cannot be removed, they must be marked by obstruction lights."

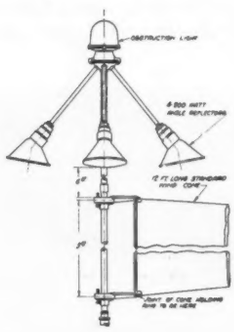


The light units are either single globes • or paired units, •• with lamps covered by a red cover glass. Where there is an extended obstruction, such as a clump of trees, double units are used to mark the outside limits of the obstruction; between these markers, single-globe lights are installed on poles ⁄ on from 150-foot centers (obstructions close to the field) up to 300-foot

centers (where obstructions are more than 1,000 feet from the field boundary).

Obstruction lights may be independent units for attachment to an existing structure, or erected on poles to define the obstruction area; or they can be mounted on cones to locate △ on elevated features such as embankments or dikes. In addition, obstruction lights (double) are mounted on any floodlight standards that may occur. As in every other phase of airport lighting, CAA is well equipped to advise on desirable installation of obstruction lights.

Illuminated Wind Cone. The lighted wind indicator ⊲• is recommended by CAA for all classes of airports. This consists of a standard 12-foot

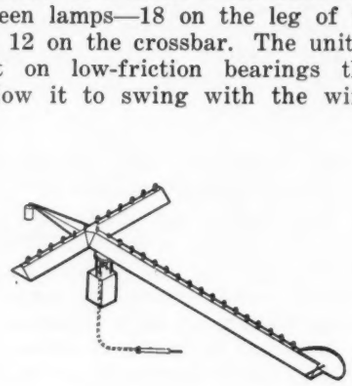


wind cone, lighted by reflectors mounted above on an arm. This unit may be installed on the beacon tower, on a hangar, or other airport building. White light is used.

Another standard type is an internally lighted cone. A single red obstruction light is used above the installation, unless it is mounted in assembly with some other unit (such as the beacon) which is higher, in which case the obstruction lights are at the top of the assembly.

Contact Lights. Contact lights are flush-mounted, installed along both edges of the runway on 200-foot centers to define the runway area. Except for the final 1,500 feet of a runway, white light ○ is used; for the last 1,500 feet of runways, flush markers use a split filter ◐ —half clear, half yellow. The yellow shows toward the farthest end so that an incoming or outgoing pilot sees all clear lights except for the last 1,500 feet which show yellow. Lenses of contact lights throw two main beams—each in the angle of approach and slightly "toed in" toward the center line of the runway.

Illuminated Wind Tee or Tetrahedron. Recommended for Class 3, 4, and 5 airports to give helpful indications on wind conditions to incoming pilots, the wind tee ⟝⊕ consists of a metal T-bar lined with green lamps—18 on the leg of the T, 12 on the crossbar. The unit is set on low-friction bearings that allow it to swing with the wind.



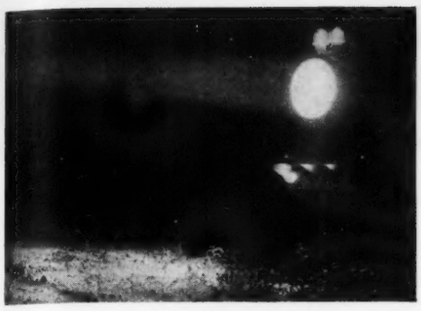
Usual location is on ground outside the landing area where gusts and eddies will not be produced by buildings.

The tetrahedron ◁ has the same application but is a larger unit; its position can be readily determined from ground level prior to take-off.

Landing Area Floodlighting. Where landing floodlighting ◓• is used, units are placed at the edges of the landable area at either end of the runway. They must not be in line with the edges of the runways; preferred installation is at 250 feet either side of the center line of the runway.

One of the earliest types of airport lighting, it is recommended as standard equipment for airports with runways in excess of 3,700-foot lengths. It is also advantageous in solving certain special problems.

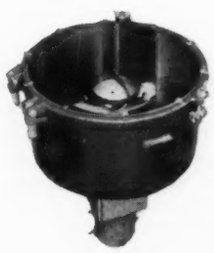
In snow country, for instance, where blowing snow may obscure all surface lights, while the air at 15 or 20 feet is perfectly clear, floods turned on at both ends of the runway have



been found extremely useful in defining it for incoming pilots. The units are either single or double standard type, with paired obstruction lights topping the assembly. The lens is prismatic so that the beam has narrow vertical divergence and is spread horizontally as required for the particular runway.

Apron Floodlighting. Floodlights of various kinds are also used to illuminate aprons or other exterior areas adjacent to airport structures. Apron floods are usually attached to the buildings themselves, while general floodlights are customarily on standards located where the light is needed.

Ceiling Projector. The ceiling projector ⊥ is actually a piece of



meteorological equipment, as it is a light used to determine ceiling heights by projecting a beam at a fixed angle (usually 90 degrees) up to cloud level. To compute the height, a sighting device known as a clinometer is operated at a known distance (generally 1,000 feet) from the ceiling projector. The distance between projector and observation point, plus the angle reading, plus trigonometry give the answer. Light from the ceiling projector is white.

Taxi Lights. Taxi guidance lights ⊖

are of a flush type similar to contact lights but equipped with a blue lens. These are used along the left-hand edge of taxi strips, where they are most readily visible to the pilot. They are used to direct pilots to follow an assigned route from one point of the field to another.

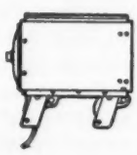
Approach Lights. For airports with runways in excess of 4,700 feet, approach lights are recommended

Incandescent ▽ — *Neon*

for every instrument runway. These look like inverted street lights and are located in the approach zone and provide a red, high candle power beam. Their purpose is to lead the incoming pilot into the runway under conditions of poor visibility.

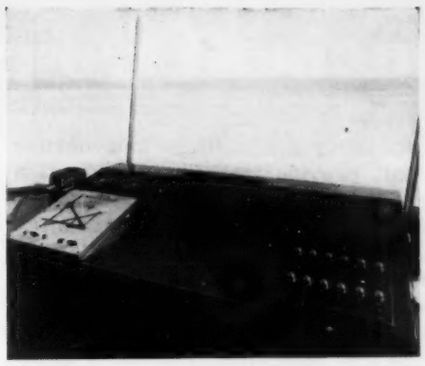
In addition to the units described above, red and green traffic lights may also be used for special instructions to pilots maneuvering planes on the field. Then there are some new and experimental types of airport lighting units. At the Washington National Airport, for example, a flush-mounted combination arrow and cross indicator is installed at each end of runways. When the green arrow is lighted, the pilot knows that the runway is clear and in which direction he should come in; when a flashing red cross shows, however, the pilot knows that the runway is blocked.

For use of the control tower operator to signal landing or take-off instructions, there is a portable, plug-in light device called a traffic pistol



light. Designed with some of the characteristics of a pistol—sighting element and a pair of hand-holds with triggers—the unit is manually operated and transmits code flashes.

Over-all control of a field's lighting system heads up at some central point—in the control tower, if there is one. For the more thoroughly integrated systems, all switches are organized into a single control panel or desk, with each switch accompanied by a pilot light to indicate operation. Frequently the panel or desk includes a facsimile map of the whole airfield that provides a quick



close-up check on what lighting is turned on and where.

As noted above, the types of lights and their application on airports are well defined by Federal regulations. However, many new types will be forthcoming for traffic-control use at airports. It is in this province that much research is now going forward. The use of lights for traffic control promise to simplify the control tower operator's job considerably by permitting him to signal incoming and outgoing planes rather than by giving verbal instructions by radio.

Basic to any lighting installation, naturally, is an efficient source of electrical power. If the port is built beyond the power lines, this problem may involve inclusion of a local power generating plant with switchboard panels, transformer, and distribution equipment, and space planned for storage of fuel to serve the engine room.

Communication and Radio Navigation Facilities

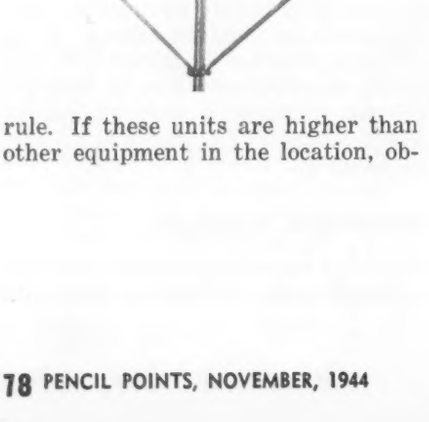
Very important to an airport's efficiency are the various elements of radio and telephonic communication —for the radio beacon, ground-to-plane, and port-to-port communication. Regular telephone service must also be provided, of course, and at the larger ports a public address system, used for paging, announcements, and issuing general orders, is usually standard equipment. To service any or all of these systems, space must be provided for installation of transmitting or receiving equipment, wiring panels, and control boards. Even for ports that are connected with existing telephone networks, an interior telephone system to connect the various buildings at the port will usually be needed.

Meterological Equipment

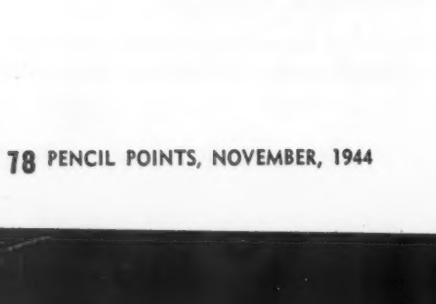
Of prime importance to the safe and efficient conduct of modern air traffic

are those mechanisms and devices that provide reliable information about the winds and weather. Already mentioned (under the heading of Lighting Equipment) is the ceiling projector which, in combination with a clinometer, facilitates a calculation of ceiling levels. Wind cones and tees (also described under lighting) are other basic elements providing wind-direction information. Local weather bureaus supply weather information to airports, but even so, it is considered important for the individual airport to maintain its own on-the-spot indicators and calculators.

These include mechanisms that indicate the wind direction and record velocity. The direction transmitter, a latter-day version of the weather vane, consists of an arrow and fin, mounted to swing in the wind and accompanied by the letter "N" to indicate true north. The velocity trans-



mitter is made up of cup-like units mounted around a central axis. The wind-catching cups spin in the wind, and transmit the velocity to a dial for reading. These two units are usually mounted on a special framework, located near or at the top of an airport structure—on the control tower, as a



rule. If these units are higher than other equipment in the location, obstruction lights will be used to mark the support holding the weather-indicators.

Other weather-determining units are: balloons and theodolites for measuring cloud heights in the daytime; microbarographs for accurate measurement of prevailing air pressures; aneroid barometers for pressure measurements; pressure change indicators for use in forecasting; thermographs for temperature measurement and recording; special thermometers, rain and snow gauges; and radiosonde equipment for learning weather conditions at different altitudes.

Facilities for Portable Equipment

Additional facilities for which the airport architect may have to provide are storage places or garages for mobile and auxiliary electrical generating and lighting equipment, either truck mounted or assembled on portable carts; fire-fighting equipment may require most of the facilities of a community firehouse; engine starter units, snow plows, etc., may also need storage space.

Water and Sewage Disposal

As in all building operations, provisions will have to be made to provide water supply and sewage disposal. In remote locations it may be necessary to construct a complete water system —wells, purification elements, water-pumping equipment, and a circulating system.

Usually the sewage system will be linked to an efficient municipal or state disposal system; but beyond the service lines a complete self-contained system may be required to collect, digest, and eventually absorb the sanitary wastes from the various airport services. A carefully designed septic tank system will serve most small airport requirements, with either a drain field or (in some places where the soil will absorb liquids at a rate sufficient to lower the water level 1 inch in 5 minutes) sand filters. Where gravity flow cannot be counted on, specially engineered layouts involving sewage pumps may be necessary.

Some Fundamentals of Airport Design

This section contains two informative articles and a series of six charts which contain, in condensed form, much information necessary to the airport designer. William Varker, who contributes an article on basic design factors, has had a hand in the development of many airports built during the current war. Elwyn E. Seelye, consulting engineer, who has likewise had much experience in this field, presents a brief analysis of factors affecting soil stabilization and paving for airports. The charts are from a forthcoming manual by Mr. Seelye.

I Criteria for Site Selection and Airport Development

by William Varker, Architect and Airport Consultant

With air transport growing so rapidly, prospective traffic volumes will be many times anything experienced before the war. So much has been learned about airport design and management in the last five years that it is now recognized to be just as highly specialized a development as hospitals, hotels, or if you please, great railroad terminals. Each includes many operational functions which must be carefully coordinated if the overall design is to be efficient and is to permit maximum use for minimum cost of construction and maintenance.

No two communities and no two sets of local conditions are sufficiently alike to permit of identical solutions in any of the fundamentals. Soil, atmospheric, and air traffic conditions may be similar: highway connections; distribution of industrial, commercial, and residential areas; and topography will probably be substantially different. Therefore each airport deserves a careful pre-analysis as to its design criteria preliminary to selecting a site or even tentatively designing the airport. An artistic rendering of a dreamy design is highly dangerous; it may become the ideal of the authorities, impossible to achieve.

Essential Steps in Preliminary Design

First: Make an analysis of air traffic requirements. What will be the volume of commercial and private flying? How many passengers may eventually be handled and during what hours? How will they get to the air terminal build-

1. FACTORS IN PLANNING

1. SIZE OF COMMUNITY SERVED **Small—up to 25,000** **Medium—25,000 to 250,000** **Large—over 250,000**	**Large cities** will require one or more Class IV or V airports (see chart 5 for CAA classes, etc.) as terminals for regularly scheduled service and one or more Class I, II or III airports for non-scheduled services (see 2 below for service classification). **Medium size cities** will be adequately served by one Class III airport, capable of expansion to Class V and with additional Class I or II airports as may be required. **Small communities** will require one Class I or II airport. All airports should be planned for expansion. Separation of regularly scheduled from non-scheduled flying is desirable when volume of traffic will make this economical. Such separation should be foreseen and planned.
2. TYPE OF SERVICE COMMUNITY MAY REQUIRE	**Regularly scheduled:** Passenger, express and slow cargo, airmail, aerial taxi service. **Non-scheduled:** Private flying, schools for air training, sales and service of airplanes and parts, aerial taxi, crop dusting, fire prevention and conservation, tourist and sport travel, aerial photography, industrial freight, helicopters, air patrols by CAA and others, glider trains, private gliding. All these services should be studied to estimate present and future volume of traffic.
3. REGIONAL PLANS AND EXISTING AIRWAYS	Consult State and CAA for conflict with other airports and airways. Several small communities may be best served by one airport; consolidation may allow a larger airport with increased services. Proximity to existing important airways may increase traffic at airport; may require airport be designed for emergency landings of large planes.
4. PLANE MOVEMENTS PER HOUR (P.M.H.)	**Peak number** of plane movements anticipated, present and future, should be estimated to determine the maximum number of runways required for use at one time. **Landings** require 2 or 3 times the time needed for takeoffs. **Contact operation:** One runway—30 landings + 30 takeoffs = 60 P.M.H. **Contact operation:** Two runways—50 landings + 50 takeoffs = 100 P.M.H. **Contact operation:** More than two runways—plane movements on ground and in air must be completely analyzed for interference. **Instrument operation:** One runway—12 landings + 18 takeoffs = 30 P.M.H. **Instrument operation:** Two runways—20 landings + 30 takeoffs = 50 P.M.H. It is anticipated that technical advances will increase instrument operation rates to approximate contact operation rates.
5. SUGGESTED DESIGN PROCEDURE	1. Prepare or select a preliminary master plan based on above factors. Show all future requirements. 2. Select site—see chart 2. 3. Prepare master plan—see chart 3.

Note: Number of plane movements per hour shown in this table is based upon expectations for the very near future. In the case of instrument operation, for instance, present max. pmh is 12 to 18, but development of common types of instruments will very shortly permit 30.

Fundamentals of Airport Design

2. FACTORS IN SITE SELECTION

PROXIMITY TO OTHER AIRPORTS	6 miles between centers minimum.
GROUND TRANSPORTATION	Site should be served by adequate ground transportation facilities for passengers, freight, employees, and visitors. Generally an express highway will be required for Class III, IV, V airports. Speed, allowable traffic volume, cost of existing or proposed facilities, distance from city are factors.
FUTURE EXPANSION	Sufficient land available to buy or option to allow for economical development of master plan.
APPROACH ZONES	See Chart 4. Standards indicated must be complied with at any stage of master plan.
EXISTING OBSTRUCTIONS	Practicability of removal of high buildings, stacks, power lines, etc., should be determined.
TOPOGRAPHY	Balanced costs of grading and drainage should be attained. Flat land requires excessive drainage. Hilly land requires excessive grading. investigate floods at valley sites; destructive winds at elevated or exposed sites. Look for sites slightly above level of flat country or on long easy slopes in hilly country.
WIND	Sites with prevailing wind from 1 or 2 directions may require runways in only 1 or 2 directions, thus reducing cost, taxiing time.
VISIBILITY	Avoid known areas of frequent fogs; often found along large water bodies and near industrial areas.
SOIL*	A1, A2, or A3 soils desirable; A4 to A7 soils require surface and subsurface drainage and substantial base and sub-base courses. Construction over A8 soil extremely costly.
CONSTRUCTION MATERIALS	Short haul to deposits of A1, A2, A3 soils or to stone quarries important.
UTILITIES	Study cost of providing sewer, water, gas, electricity, gasolene, telephone, etc.
EXISTING AIRWAYS	Locate close to existing airways if other factors balance.
ZONING	Zoning regulations should be available or contemplated to limit future building outside airport in accordance with Approach Standards.

*See accompanying text.

ing? How much parking space will be necessary for passenger automobiles?

How much space is necessary for ticket offices, airline business offices, hangars, repair shops? To what degree will national and international flying affect the design? What percentages of commercial flights will be for passengers, what for mail, express, or freight? In short, what is expected of the airport immediately after it is put in operation, and what can be estimated as to its probable requirements 10 or 20 years later? There appears to be no record of any terminal facility now in operation which is large enough or which has proper arrangements for present operation, let alone for necessary expansion.

Second: Having in mind general requirements, and resultant knowledge of approximate overall sizes, a study should be made of connecting transportation for passengers, mail, and cargo; and a search should be begun for a location. Recent experience in airport design indicates that the first cheap, large, level piece of ground should not be accepted without thorough inquiry. It may prove the most expensive in the long run. High speed transportation must be made available. Soil and subsoil conditions must be studied so that earth moved for grading may be stabilized, the surface may be paved economically, and maintenance may be satisfactory. Also, the flattest ground available may prove more expensive to drain than slightly rolling ground, as earth is now moved so inexpensively that such movement is frequently more economical than costly drainage systems. At this point competent civil engineers with experience in earth movement, soil mechanics, paving, etc., must be consulted.

With regard to the runway pattern, too much depends on the volumes to be handled and the problem is too broad to be described here. There will be airports with only one landing strip and there will be others with as many as sixteen or more and with networks of connecting taxiways and aprons. If volumes of flights are such that two or more runways must be operated simul-

Fundamentals of Airport Design

taneously, certain very definite safety standards must be observed particularly with regard to distances between the two simultaneously operated runways; and minimum horizontal and vertical separation must be maintained by planes in the air. Thus, especially in those areas where bad weather flying will be necessary for a substantial number of days in the year, a real problem presents itself. The runway systems of the future will develop on either the parallel pattern or the tangential. There seems no practical reason for the so-called overall paving of vast areas as the planes must, in any event, follow narrow, well defined paths to avoid collision.

Third: The design of the airport itself may now be started. Consideration must be given to existing or future highways and to other forms of high speed transportation, and connections must be brought in to a focal point within the airport. On large terminals this must be as near the center of the runway pattern as possible in order that plane taxi distances may be reduced and time may be conserved. On smaller airports it may still prove desirable to establish the focal point on one side of the runway pattern. It will be seen immediately that this central point must handle not only passengers, visitors, and sightseers, but also baggage, mail, express, and freight; and the flow of these various types of traffic must be smooth, and eventually separated from one another, so as to avoid confusion. If the runway pattern is established first, the operational facilities will be squeezed into what space remains, not based on ideal operation. If the operational facilities are considered first, bearing in mind the movements of the planes, the runway pattern may more easily be designed in relation to the central station.

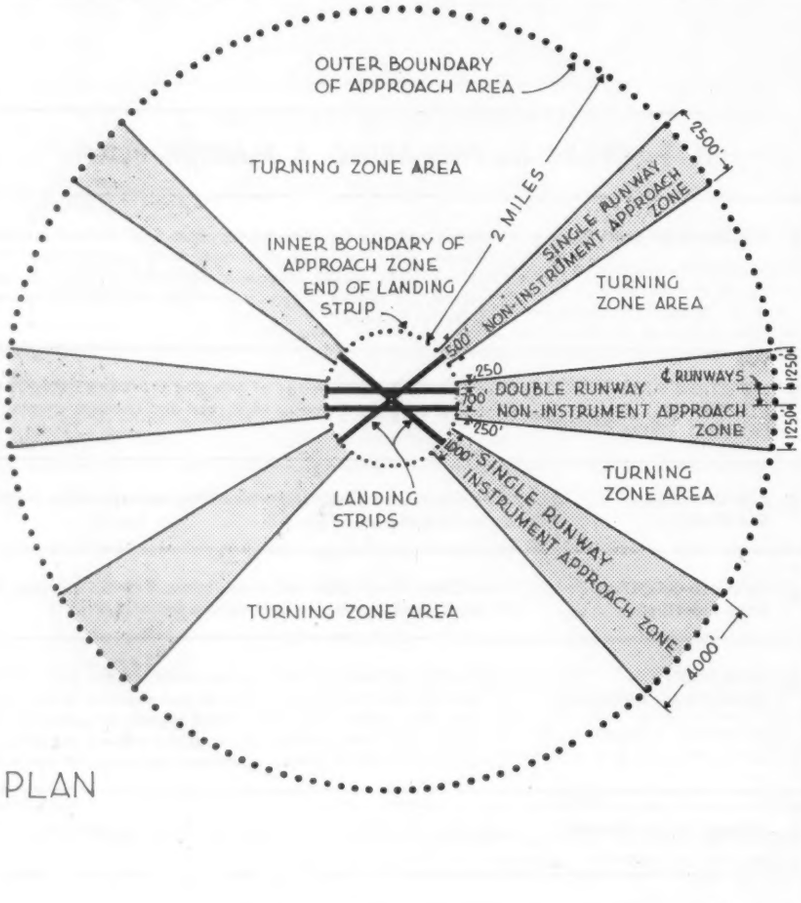
Handling employees is also important in an airport of any size. Workers must find it easy to get to work. This becomes no small problem when it is realized that in at least one airport now being designed in the United States 40,000 employees are eventually contemplated. This becomes effective when the airport handles 20,000,000 passengers per year and has a maximum peak

3. FACTORS IN PREPARING A MASTER PLAN

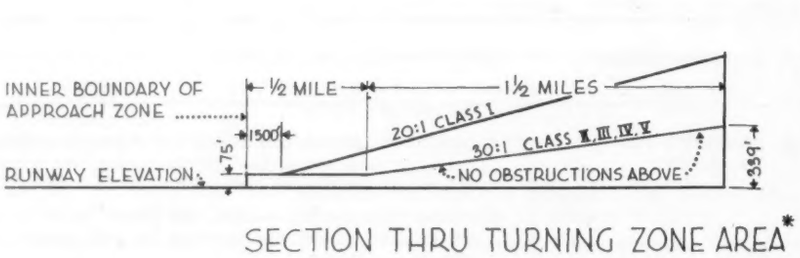
1. PRELIMINARY SURVEYS	Prepare property, location, topographic, and obstruction maps. Secure data for wind rose and aerial photographs. Soil survey data should include identification of surface and subsoil, soil profiles, ground water table, location of available material deposits.
2. DIRECTION AND NUMBER OF LANDING STRIPS	See Chart 5 for percentage of time that prevailing winds allow use of runways. Construct wind rose and compute coverage.
3. AIRPORT SIZE STANDARDS	See Chart 5 for CAA requirements for runway widths, lengths, grades, etc.
4. GROUND FACILITIES AND LIGHTING	See Chart 6 for CAA recommendations. Provide parking for employees, passengers and visitors.
5. LIMITATION ON BITUMINOUS PAVEMENT	For service aprons, parking aprons, hardstandings, turnarounds, and all other pavement subject to high shearing stress occurring when planes turn with locked wheels or subject to the action of oil and gasolene dripping and spilling, use concrete or surface-treated gravel; bituminous pavement not indicated.
6. DESIGN OF PAVEMENT	See text for factors affecting design of pavement thickness.
7. DRAINAGE DESIGN	See text for design considerations.
8. COMPLETED PLANS TO INCLUDE:	Grading: Plans, profiles, and sections with existing and finished grades for both present and ultimate development. Location of available construction material. Drainage: Plans, profiles, sections, and details for all piping, ditches, subdrainage, and structures for both present and ultimate development. Runways, Taxiways, Aprons, Parking Areas, Access Roads: Plans showing location, intersection details, expansion joint details; cross sections and profiles. All future paved areas to be indicated. Lighting: Size, type, location and details of lights, cables, transformer, underground ducts, control points and wiring. Utilities: Sewer, water, telephone, power complete for airport including connections to outside source or disposal. Buildings: Location of all present and future buildings, including off-site proposed development. Plans in detail for present work . Zoning Plans: Sufficient to enact as local law. Stage Construction: Show time when construction of each item or part of master plan should be started and completed in order to satisfy estimated future air traffic requirements. Construction should not interfere with operation of airport.

Fundamentals of Airport Design

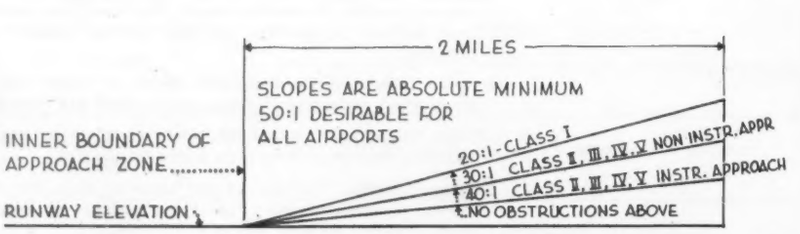
4. APPROACH STANDARDS



PLAN



SECTION THRU TURNING ZONE AREA*


2 MILES
SLOPES ARE ABSOLUTE MINIMUM
50:1 DESIRABLE FOR ALL AIRPORTS
INNER BOUNDARY OF APPROACH ZONE
20:1-CLASS I
30:1 CLASS II, III, IV, V NON INSTR. APPR
40:1 CLASS II, III, IV, V INSTR. APPROACH
RUNWAY ELEVATION
NO OBSTRUCTIONS ABOVE

SECTION THRU APPROACH ZONE*

*ADAPTED FROM DWG. 152-C, CIVIL AERONAUTICS ADMINISTRATION

hour operation of between 200 and 300 plane movements.

Current Developments Indicate Future Needs

Fortunately it now appears evident that it will not be necessary to provide ever-increasing runway lengths for larger and faster planes. Improvements in motive power and knowledge of airfoil have apparently arrested this trend. Even if auxiliary acceleration power becomes necessary for take-offs, it is unlikely that runways will have to be increased substantially over maximum lengths now in use. However, commercial passenger planes have already been built with wing spreads and wheel loadings very much greater than is commonly known (for instance, wing spreads over 300 feet and wheel loadings over 100,000 pounds) so that widths of runways and the bearing surface of paving needs careful analysis. This of course applies only to those airports which will service large commercial planes.

Many smaller airports, however, may be required to handle equally large cargo planes. Also they may be required to handle tractor planes towing gliders requiring wider runways, and in many cases special taxi-way facilities. Whether these extreme sizes must be serviced in the early stages or not, it would seem wise to plan the airport for maximum eventual use and to construct initially for those services which are presently required.

Tremendous strides have been made in flying in what has hitherto been considered bad weather, and all airports wishing to be classified for commercial flying by the CAA must include provisions not only for instrument flying but for handling planes expeditiously on the ground, so that incoming planes will not be held unnecessarily long in the air.

Commercial Expansion

If the airport is to handle any commercial flying at all, tentative schedules and volumes of passengers should be established in order to determine the size of air terminal buildings, approach highways, parking areas, etc. It frequently occurs that municipalities are disagreeably surprised to find out what these amount to. Here again space must be allowed for expansion, as all these facilities should be designed to accommodate the maximum volume expected over a long period of time, whether the full facilities are ever built or not.

Site Selection

In selecting a site care must be taken that the designer be familiar with CAA

requirements as to approach zones, to see that no hazardous obstruction exists. Also it is incumbent upon the planners to refrain, if possible, from selecting a location which will deteriorate existing residential units or limit the expansion of proper residential or other areas which might find the noise and confusion of an airport unbearable.

Surface transportation to and from the airport becomes quite a problem as the success of air travel will to some extent be determined by the length of time it takes the passenger to get to his destination from his point of origin, including transportation to and from the airport at both ends. Commercial airlines agree that it will probably be necessary to make available, under their own control, transportation for those passengers who wish to use it, and therefore one requirement is a centrally located terminal to which passengers may come to buy tickets and deposit baggage. While this may not prove a serious problem in some communities, it becomes decidedly difficult in others, and in fact the location of this central station may actually have a bearing on the selection of the site.

Wherever possible, locations should be sought adjacent to express highways, as it will frequently be found preferable to travel longer distances at higher speeds than to risk the serious delays, often unavoidable, of travel on city streets.

Experience has proved that when the over-all problem is separated into a number of smaller problems, each studied separately and in relation to the whole, the plan in its entirety will develop and will permit of a minimum expenditure. In this way none of the essentials should be omitted and unnecessary items will not be included. Therefore the over-all cost should be less than if a more elegant, arbitrary scheme, into which the essential functions are forced, is adopted. Such unnatural planning always costs more in the end.

I would like to point out that the design of an airport, like any other engineering problem, is no mystery. There is a world of information available for those who seek it, and the conscientious designer will merely take off his coat and go to work to find out what his problem is. When he has done so with thoroughness the solution for the whole is very likely to stand up on its own hind feet and look him in the face.

The article by Mr. Seelye, on "Drainage, Soil Mechanics, and Pavement Design," which is also part of this section, starts on the following page.

5. SIZE STANDARDS (Adapted from "Airport Design Information," Civil Aeronautics Administration, May 1944).

CLASS OF AIRPORT	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V
Type of community	Small communities not on present or proposed air carrier system. Includes communities up to approximately 5,000 population	Larger communities on present or proposed feeder line airways and having considerable aeronautical activity. General population range 5,000 to 25,000	Important cities on feeder airlines and many intermediate points on main lines. General population range 25,000 to several hundred thousand	Cities in this group represent the major industrial centers of the nation and important junction points or terminals on the airways system	Same as Class IV
Type of plane which airport may safely accommodate	Small private-owner planes up to 4,000 lb. gross weight, or those whose wing loading times power loading does not exceed 190	Large private planes; some small transport planes in gross weight range between 4,000 and 15,000 lb., or having wing loading times power loading of 190 to 230	Present-day transport planes between 10,000 and 50,000 lb. gross weight, or having wing loading times power loading of 230 and over	Largest planes in use and those planned for immediate future; gross weight 74,000 lb. and over; wing loading times power loading 230 and over	Same as Class IV
Length of landing strips[1]	1,800 to 2,700 ft.	2,700 to 3,700 ft.	3,700 to 4,700 ft.	4,700 to 5,700 ft.	Over 5,700 ft.
Width of usable landing strips	300 ft.	500 ft.	500 ft.	500 ft.	500 ft.
Length of runways	None	2,500 to 3,500 ft.	3,500 to 4,500 ft.	4,500 to 5,500 ft.	Over 5,500 ft.
Width of runways	None	150 ft., night operation; 100 ft., day operation only	200 ft., instrument landing; 150 ft., night operation	Same as Class III	Same as Class III
[2]Percentage of time that prevailing winds, including calms[3], permit use of landing strips and runways	70%	75%	80%	90%	90%
Minimum distance between center lines of parallel runways	—	700 ft.	700 ft.	700 ft.	700 ft.
Minimum distance between center line of runway and airport buildings: Instrument landing runway	—	750 ft.; desirable 500 ft.; minimum 350 ft.	750 ft.; desirable 500 ft.; minimum 350 ft.	750 ft.; desirable 500 ft.; minimum 350 ft.	750 ft.; min. 350'; des. 500'
All other runways	—				
Minimum distance between center line of runway and aprons and loading platforms: Instrument landing runway	—	500 ft.	500 ft.	500 ft.	500 ft.
All other runways	—	250 ft.	250 ft.	250 ft.	250 ft.
Landing strip and runway grades—transverse	2% maximum	2% maximum	1½% maximum	1½% maximum	1½% maximum
Landing strip and runway grades—uniform longitudinal	2% maximum	1½% maximum	1½% maximum	1% maximum	1% maximum
Grade breaks—longitudinal[4] (maximum algebraic difference)	3%	2½%	2%	2%	2%
Gross plane weights for runway and apron paving based on present-day aircraft, to be considered distributed equally between two main wheels or sets of wheels	No paving recommended	30,000 lb	74,000 lb.	120,000 lb.	120,000 lb.
Probable future (10 years) maximum static gross plane weight to be considered in designing runway and apron paving, and drainage structures	20,000 lb.	60,000 lb.	150,000 lb.	300,000 lb.	300,000 lb.
Recommended gross weight to use for design	20,000 lb.	60,000 lb.	150,000 lb.	300,000 lb.	300,000 lb.
Probable range of static airplane tire pressures	10 to 25 psi.	15 to 50 psi.	30 to 75 psi.	50 to 85 psi.	50 to 85 psi.

NOTES: [1] All the above landing strip and runway lengths are based on sea-level conditions; for altitudes above sea-level increase runway length 25 ft. per 100-ft. increase in elevation. One surfaced runway is recommended for each landing strip for Class II, III, IV, and V airports.

[2] Landing strips and runways should be sufficient in number to permit takeoffs and landings to be made within 22½ degrees of true wind direction for the percentage shown above of winds 4 mph. and over, based on at least a 10-year Weather Bureau wind record where possible.

[3] Winds 3 mph. and less.

[4] Longitudinal intersecting grades on a runway or landing strip should be joined by a vertical curve, if the algebraic difference in grades is 0.40% or more. The vertical curve should be at least 300 ft. in length for each 1% change in grade. It is also recommended that the tangent interval between the point of tangency of the curve and the point of curvature of the succeeding be not less than 100 ft. If economically practical, grade breaks should be so controlled that the sight line will be unobstructed from any point 10 ft. above the surface of the runway to any other point 10 ft. above the runway.

Fundamentals of Airport Design

6. FACILITIES, LIGHTING, TAXIWAYS

A. MINIMUM FACILITIES RECOMMENDED BY CAA*

AIRPORT CLASS	I	II	III, IV, V
Drainage	Include	Include	Include
Fencing	"	"	"
Marking	"	"	"
Wind Direction Indicator	"	"	"
Hangar	"	"	"
Shop	—	"	"
Fueling	—	"	"
Weather Information	—	"	"
Office Space	—	"	"
Parking	—	"	"
Weather Bureau	—	—	"
2-Way Radio	—	—	"
Visual Traffic Control	—	—	"
Administration Building	—	—	"
Taxiway and Aprons	—	—	"
Instrument Approach System (if needed)	—	—	"

B. MINIMUM LIGHTING RECOMMENDED BY CAA*

AIRPORT CLASS	I	II	III	IV, V
BASIC LIGHTING, including: Airport Beacon, Boundary Lights[2], Range Lights, Obstruction Lights, Illum. Wind Cone[1]	Optional	Include	Include	Include
Contact Lights (including Range Lights)	—	"	"	"
Illum. Tee or Tetrahedron	—	—	"	"
Landing Area Floodlights[3]	—	—	"	"
Apron Floodlights	—	—	"	"
Ceiling Projector	—	—	"	"
Taxi Lights	—	—	—	"
Approach Lights[4]	—	—	—	"
KWH Needed	10-15	15-20	20-40	40-80+

NOTES: **1**, Installation of auxiliary beacons depends on airport location.

2, Use in lieu of contact lights at all-way type of field having no all-night operator to select landing direction.

3, Provide at all lighted fields where blowing snow occurs.

4, Install at each instrument-approach runway.

*See also their lighting standards.

C. TAXIWAY STANDARDS RECOMMENDED BY CAA*

AIRPORT CLASS	II	III	IV	V
Minimum Width of Taxiways	50 ft.	50 ft.	50 ft.	50 ft.
Minimum Distance, Runway Center Line to Taxiway Center Line	275 ft.	275 ft.	275 ft.	275 ft.
Minimum Distance, Boundary Fence, Obstructions, etc., to Taxiway Center Line	100 ft.	150 ft.	150 ft.	200 ft.
Maximum Longitudinal Grade	3%	2½%	2½%	2½%
Maximum Transverse Grade	1½%	1½%	1½%	1½%
Minimum Angle of Taxiway Intersection with Runway Ends	60°	60°	60°	60°

Runway grades should not be altered to meet taxiway intersections or connections. At large airports where traffic is heavy it may be advisable to construct a warming-up apron and bypass on taxiways connecting to the ends of runways. Taxiways should not connect to the ends of runways at an angle of less than 90° to incoming traffic.

II Drainage,

by

The war has stimulated design and construction of military airports and provided useful experience to serve as a basis for designing to meet future civilian needs. For these, both improved quality and reduced costs are essential.

Once location and width of runways have been determined, the primary engineering problems are: (a) drainage; (b) properly compacted foundation for the pavement; (c) determination of type and thickness of pavement in accordance with bearing capacity of foundation and anticipated wheel loads. This applies equally to taxiways, runways, and parking areas.

Drainage design requires careful study of topography, volume of rainfall, rate of runoff, and adequate facilities to take care of drainage even beyond the limits of the airport itself. A properly designed drainage system will result in a ground-water level substantially below subgrade of runways. (If this is not the case, ground water may cause settlement, loss of stability, frost heave, and disintegration.) Liberal allowances should always be made to remove adequately any unusually heavy rainfall.

Military and Civilian Drainage Systems

The type of drainage provided depends on the use and purpose of the field. Drainage for military fields of tactical and strategic importance should be so designed that ponds never form on runways. However, on training and satellite fields temporary "ponding," for short periods after storms, is usually permissible.

Drainage of civilian fields also depends on their use and classification. The drainage system for a scheduled air transport field should obviously be more elaborate than the system for a pleasure-flying field. For civilian fields the drainage system is frequently designed to remove within two hours the runoff from the maximum one-hour rainfall expected in two to five years. In any case, even in turf areas between runways, water should not be allowed to stand in ponds for a sufficient time to allow the water to saturate the base beneath any paved areas.

Careful attention must be paid to the problem of maintaining firm shoulders at pavement edges. This condition may

Soil Mechanics, and Pavement Design

Elwyn E. Seelye, Consulting Engineer

be attained by giving turf shoulders more pitch than the adjacent pavement or by providing a gutter or swale just beyond the pavement, with inlets spaced at suitable intervals. The practice of constructing gutters and inlets within the paved area of the landing strip is at present discouraged.

In general, storm drainage pipes or French drains should never be placed under the pavement nor should the surface drainage system be combined with the sub-drainage system. Filter backfills for sub-drainage trenches must be carefully designed lest dangerous cavities occur in the soil beneath landing areas.

Soil Mechanics

Practical application of the theory of soil mechanics has contributed greatly to improvement of the subgrade, subbase, and base. Our experience has produced better runways and reduced cost of pavement because, in many cases, it permits a reduced thickness of paving for the same or higher load capacities. Briefly, the methods used have been as follows:

Borings were taken of the entire area affected by new construction, careful analyses were made of samples not only of the soils on the airport, but of soils, sand banks, and gravel pits in the general vicinity for use in obtaining a proper mixture of the various types of materials to produce a properly stabilized and compacted subgrade to receive paving.

Careful control was exercised in compacting the soil and base layers at the correct moisture content to insure maximum compaction. Continual check was also made to correct deficiencies in the graduation of soil mixtures combined for the purpose of stabilization. The plasticity of the soil in the embankments and base courses was also carefully controlled. Only a very narrow range is allowable, as excessive plasticity will result in subsequent softening and frost heaving, while a certain degree of plasticity is essential to secure the required compaction and bearing value.

The speed with which military airfields are constructed, involving use of hundreds of pieces of equipment and movement of thousands of cubic yards of earth a day, presents a real problem in securing the control described above. No time can be spent in carefully preparing soil samples for transport to some distant laboratory. As a solution, complete field laboratory trucks, equipped with soil testing apparatus, are used. These mobile units work right in the thick of earthmoving operations.

Charts are made for use with the testing equipment so that few calculations are necessary. As examples: moisture contents are determined by placing a small amount of soil in a graduated flask and reading the moisture content direct from a chart, or by pushing a spring needle into the soil by a device that translates the resistance into moisture content readings. The degree of compaction of runway embankments is determined by filling a small hole made in the soil layer with pre-calibrated sand of known density. The weight of soil removed compared with the weight of the sand will give the percent of compaction with a simple slide-rule operation. Plasticity is determined by rolling a small amount of soil into a thread beneath the palm of the hand.

Stability of the soil is determined by lightly tapping a grooved pat of the wet soil in a small dish until the separated soil flows together. The propensity of soil to settle is determined by measuring the shrinkage occurring when a moist soil sample is dried. Soils subject to shrinkage of more than 2 or 3 percent are not used under landing or parking areas. Soils subject to shrinkage of more than 1 percent are not used under any paved landing or warm-up areas.

No Precedents for Pavement Design

The gravest problem of the airfield and soils engineer is to design and construct with very low safety factors for conditions of loading and impact for which there are few established empirical practices or criteria. Highway and railroad loadings have not changed for years, and in their design there is for guidance a wealth of practical knowledge based on experience in practically every locality under every kind of weather and soil condition.

In contrast, engineers were called upon to design for the 37,000 lb. wheel load of the B-17, B-24, C-46, and C-54 planes when the heaviest transports in use before the war had about 30,000 lb. gross weight or 15,000 lb. wheel load. The next step was to design for the 60,000 lb. wheel loads of the B-29, B-32, and C-74. In both cases no precedents for adequate design had been established. Postwar commercial plane wheel loads are indicated by the 84,000 lb. Boeing 314, the 60,000 lb. B-24D2, the 52,000 DCA and the 80,000 lb. planes now on order by the large airlines. Planes with 150,000 lb. wheel loads are anticipated in the near future, and airfields now under construction are being designed to handle a gross weight of 300,000 lbs. In comparison the legal maximum truck wheel load is 9,000 to 12,000 lbs.

Methods in use to design for these unprecedented airplane wheel loads include:

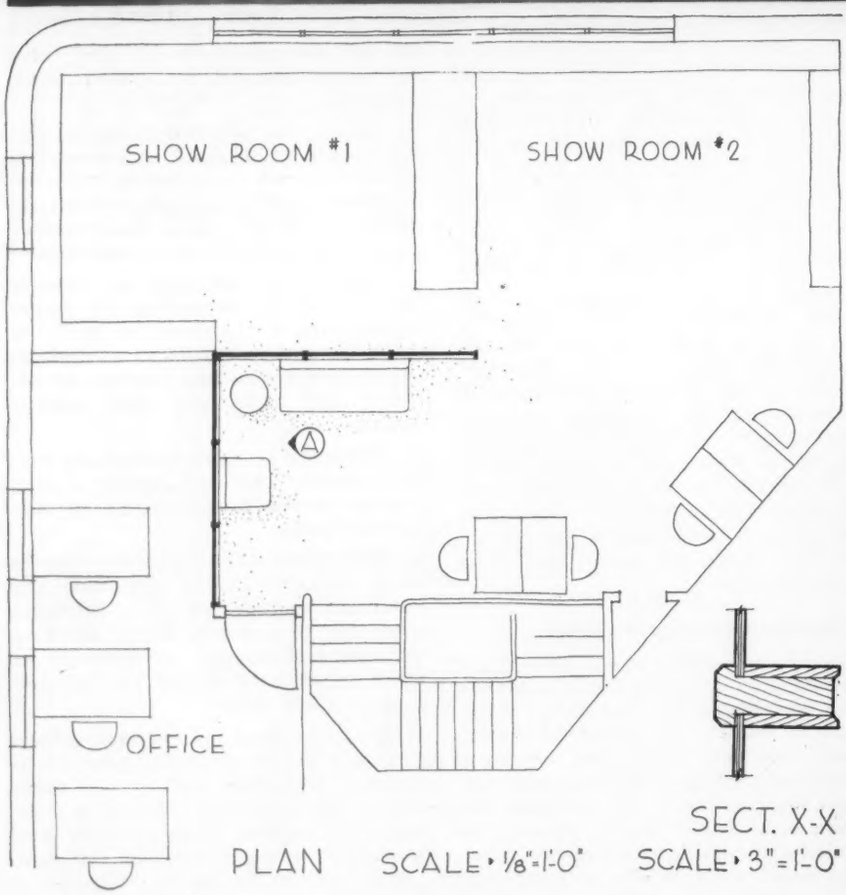
1. Plotting the pavement thickness and soil bearing value which experience has proven to be adequate for the loads encountered up to the present, and "extrapolating" (or projecting these curves) against the wheel loads of the future.

2. Loading an elliptical or circular plate equal to the anticipated future contact area of the plane tire with 1½ times the anticipated load and measuring the settlement and reaction of different soil types and trial runway sections.

3. Loading a plane undercarriage with the proposed load and testing a trial runway section to destruction by continuous traffic.

4. Mathematical analysis of the stresses to be expected in the sub-grade and pavement and design of a thickness according to a safety factor allowing the assumed number of landings or stress repetitions desired for the proposed runway life.

While all of these methods are subject to heated controversy and criticism at present, it is hoped that we will never repeat the experience of having runways and aprons constructed by prewar "good enough" methods fail completely with as few as 100 take-offs or landings. This occurred in the early days of the war.



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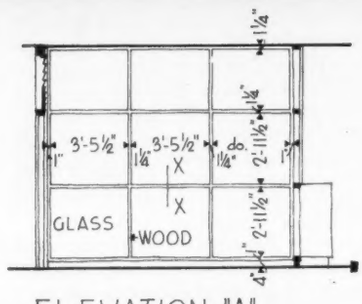
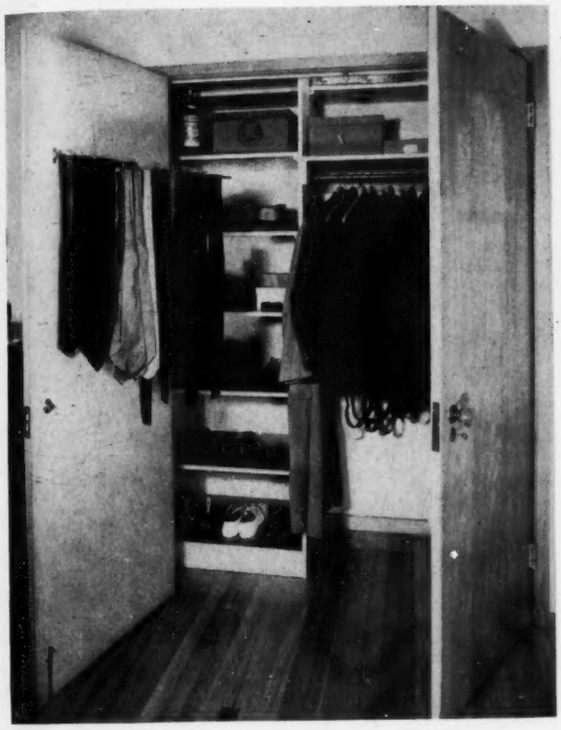
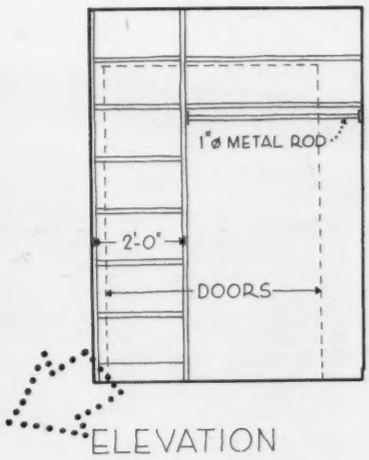
SECT. X-X SCALE • 3"=1'-0"



ELEVATION "A"





ELEVATION

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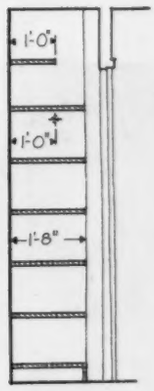

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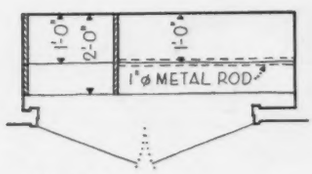
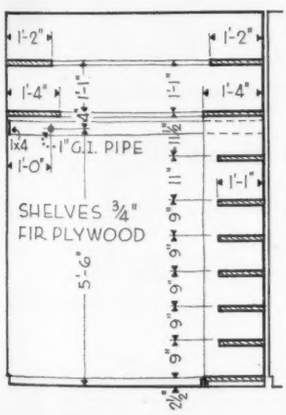
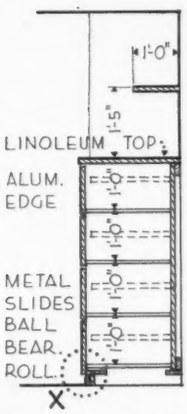


PLAN

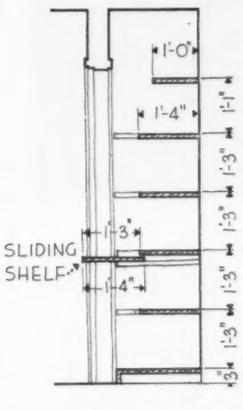
TYPICAL BED ROOM CLOSET



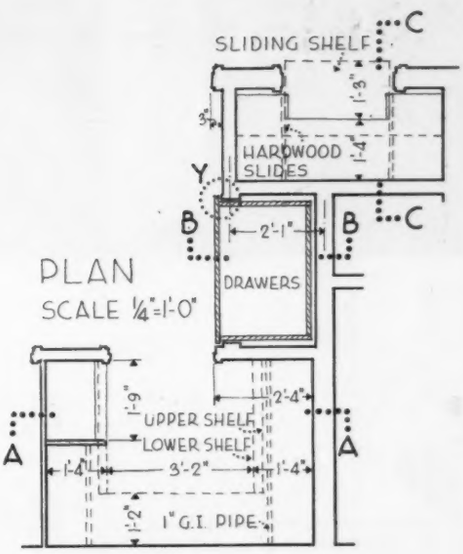
SECTION A·A

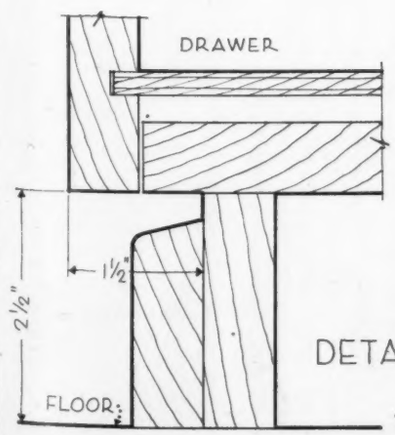


B·B



C·C





DETAIL ·X·

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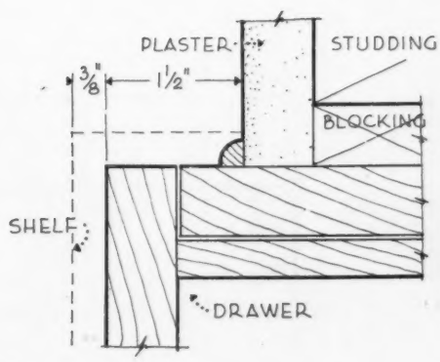
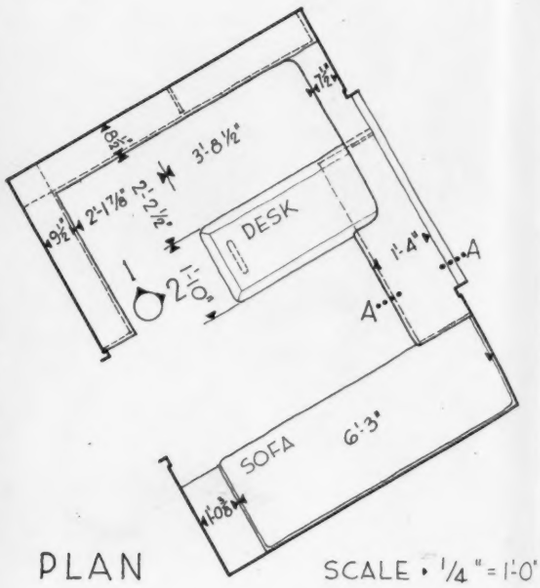
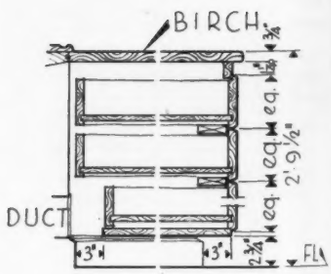


DETAIL ·Y·

DRESSING RM. CLOSETS AND DRAWERS



PLAN SCALE • ¼" = 1'-0"



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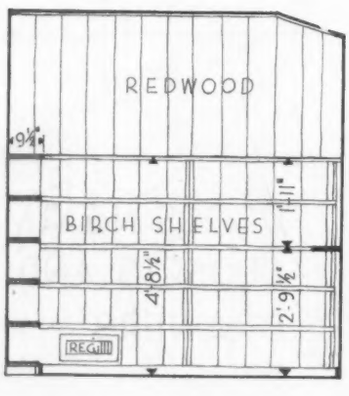

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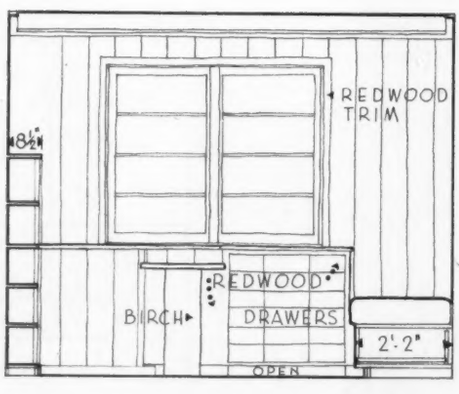
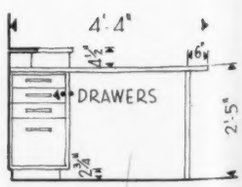


WALL 2



DESK
SCALE • ¼" = 1'-0"

JOISTS, Precast Reinforced Concrete, Continued

JOISTS WITH SITE-POURED SLAB—Values for safe superimposed loads may be based upon a T-beam section and j=⅞. Load capacity may be increased by: (1) Thickening webs at joist ends, and (2) supporting joists at mid-span until concrete slab hardens. Top rod is ⅜ round, tension rod is larger.

INSTALLATION USING SITE-POURED SLAB—First the precast joists are set at the predetermined spacing and the ends are blocked in with brick, concrete units or other means. Spreaders and form materials are then placed in such a way as to produce an embedment of the joist ½" into the slab. If suspended ceiling is to be used, hanger rods should be hooked over the joists. Openings for ducts, pipes, etc., should be boxed.

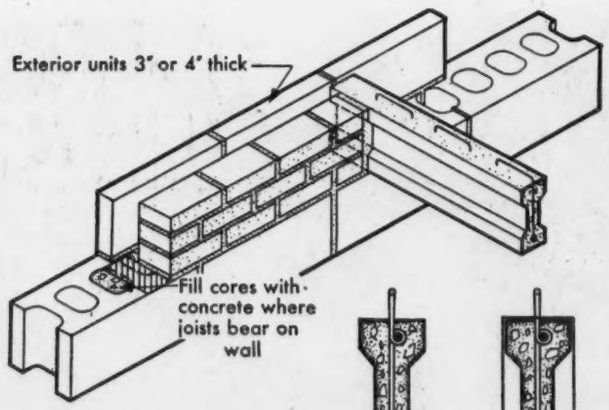
If wood forms are used, building paper is placed over them between the joists. Wood screeds should then be laid, or if a wood finish floor is to be used the sleepers should be set on top of the joists by means of clips made for that purpose.

Place 2-way reinforcement for the slab consisting of ¼" round rods 10" o/c at right angles to the joists and 18" o/c parallel to the joists. Any electric conduit should be placed at this time. The concrete is then placed and finished. Forms may be stripped after the concrete has moist-cured 5 to 7 days.

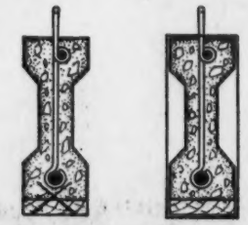
Openings for pipes running at right angles to the joists should be provided for by having the manufacturer insert plugs of gypsum or wood in the forms, near the center of the span, which may be easily knocked out on the job. Joist hangers may be obtained which are made of ¼" x 4" steel plate with ¼" thick gussets. Ends of joist can be cast to fit steel members into which they frame. Various types of form work are possible in addition to those shown in the illustration. Nailing plugs may be cast in the finished concrete slab to receive carpet strips, wooden base, shoes.

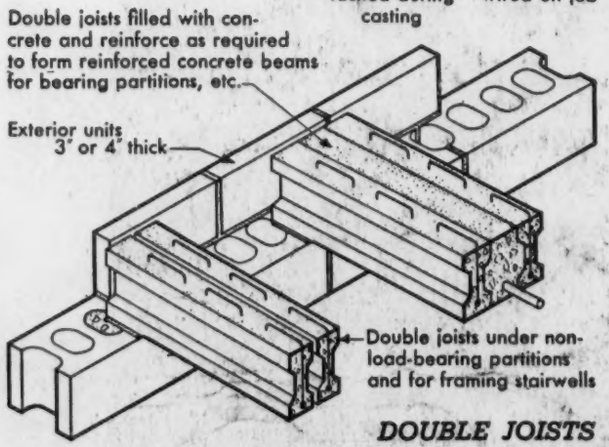
For 8-inch joists on spans of 14 feet or more, one row of shoring should be used under the center of the joists until the concrete slab has hardened. One row of shoring should be used for 10-inch joists on spans of 17 feet or more; for 12-inch joists on spans of 21 feet or more. Spans of 20 feet or more should have one row of bridging (short length of joist section) at mid-span.

PRECAST JOISTS WITH PRECAST SLAB—The principle disadvantages of the precast slab are in the difficulty of fitting standard sized (20", 24", 27" wide) slab units to varying joist centers and varying floor areas. This type also lacks the rigidity of the job poured slab and superimposed loads must be calculated on the assumption that the joists carry all of the load without benefit from the slabs. Rods at top and bottom of joist are same size.

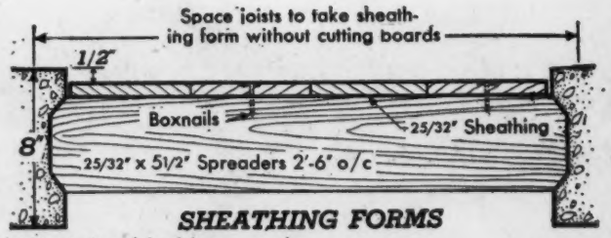


WALL BEARING



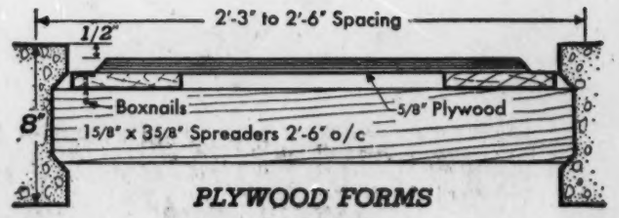

Double joists filled with concrete and reinforce as required to form reinforced concrete beams for bearing partitions, etc.
Exterior units 3" or 4" thick
Double joists under non-load-bearing partitions and for framing stairwells

DOUBLE JOISTS

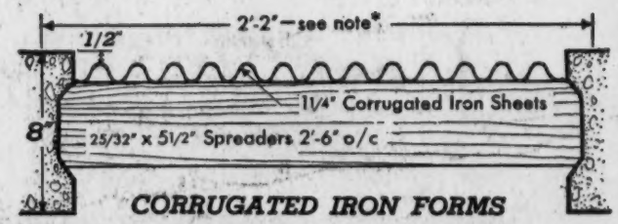


SHEATHING FORMS

Nail each piece of sheathing to every other spreader with one 6d nail. Stagger nailing.



PLYWOOD FORMS



CORRUGATED IRON FORMS

*Standard corrugated roofing finishes one edge up and one edge down. For a symmetrical panel corrugated siding (not roofing) should be used which finishes both edges down, as shown.

INSTALLATION OF PRECAST SLAB UNITS—The units are set on the joists in a bed of 1:3 mortar with 25% hydrate of lime, and leveled. The joints between units should be grouted. Precast slabs should be reinforced depending upon the load and span.

REFERENCES—A.I.A. standard filing system lists no precast concrete joists but material may be found under 4K or 10C.

Building Regulations for Reinforced Concrete, American Concrete Institute Document 318-41.

Precast Joist Concrete Floor, Systems, American Concrete Institute Report of Committee 711, Vol. 36, page 297.

How to Design and Build Precast Joist Concrete Floors, Portland Cement Association.

TRADE ASSOCIATIONS—Portland Cement Association, 33 West Grand Avenue, Chicago 10. American Concrete Institute, 7400 Second Boulevard, Detroit, Mich. The Cast Stone Institute, 2135 Queens Chapel Road N. E., Washington 18, D. C. National Concrete Masonry Association, 33 West Grand Avenue, Chicago.

JOISTS, Precast Reinforced Concrete

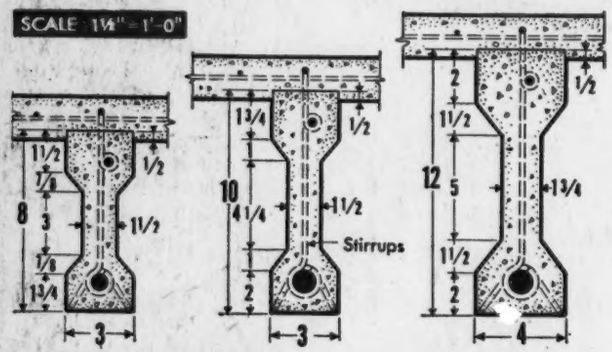
BUILDING PRODUCT FACTS by Don Graf
PENCIL POINTS • November 1944 • Serial No. 8

MANUFACTURE OF JOISTS—Since 1901 over 70 precast reinforced concrete joist or beam systems have been proposed and patented, principally in the United States, England and Germany. The Portland Cement Association, with the cooperation of manufacturers of vibrating tables, steel stirrups, chairs, wire form supports and steel forms, and the American Concrete Institute, have established standards for the manufacture of a non-proprietary precast reinforced concrete joist.

These standards are for the guidance of independent manufacturers, but it should be understood that the Association does not assume responsibility for imperfections in design, manufacture or construction, or for any failures which might result. Therefore, local suppliers should be selected on the basis of established reputation, numerous references as to service, ability, honesty, and financial responsibility.

Installation of precast-joist-making machinery by experienced concrete masonry manufacturers throughout the country has been going on since 1935 or earlier. The management and the plant personnel of such establishments are familiar with the many details of mixtures, curing and handling concrete products. They understand the necessity for close supervision and for conformity with the requirements of physical and time relationship between aggregate, cement and design to produce a finished product that will meet specifications.

Concrete joists are not a stock warehouse item, being made on order for each individual building job. Thus it becomes possible for the architect to control through specifications the color of joists used in exposed locations, openings in webs for the passage of pipes, type and weight of aggregates, and type of cement. Consideration should be given to the use of light-weight aggregate (Haydite, Celocrete, cinders, etc.) as weight reductions make possible easier handling and a larger load.



	8" Joist		10" Joist		12" Joist	
Sectional area	18.2 sq. in.		22.1 sq. in.		33.4 sq. in.	
Aggregate	Light Weight	Ordinary Weight	Light Weight	Ordinary Weight	Light Weight	Ordinary Weight
Wt. per lin. ft.	14 lbs.	19 lbs.	17 lbs.	23 lbs.	26 lbs.	35 lbs.
Maximum span	16'-0"		20'-0"		24'-0"	

DESCRIPTION—Precast reinforced concrete joists are made by pouring concrete into molds on a vibrating table. The resulting member is shaped in the form of an I-beam available in three standard depths, in lengths up to 24 feet, for use with precast slabs, or with slabs poured on the site. The joists may be left exposed, the underside to form a beamed ceiling, or the joists may be furred to receive plaster or "dry wall" construction. Any type of finish flooring can be laid over the concrete slab including terrazzo, tile, wood, linoleum, carpet, cork, rubber or asphalt tile. The concrete floor has strength and rigidity, freedom from warping, shrinkage and squeaking, it is fireproof, rotproof, and termite-proof.

USES—Precast joist floors find their principal uses in light weight construction such as residences and apartment buildings and other structures having relatively light loads, for example, live loads of about 60 pounds per square foot. Using a poured plate and ridge, the joists may be used as rafters.

COSTS—Costs of forms for concrete floors generally represent from 50% to 60% of the total floor cost. Since the re-use of forms and the simplicity of placing them effects considerable economy, it becomes possible to construct a concrete joist floor with poured slab, screeded surface, for 30¢ to 45¢ a square foot, depending upon the size of the job, complexity of framing, the inclusion of special ingredients, remoteness from the manufacturer's plant, etc. These prices must be regarded only as approximations and should by no means be taken as a basis for any estimates to an owner.

It should be noted that when used for first floor construction, the underside of wood framed floors require metal lath and plaster for fire safety. A concrete joist floor, however, does not require this finish.

SAFE SUPERIMPOSED LOAD TABLES—Load tables available at this time are incomplete for the 2½" slab thickness (the minimum thickness possible where conduit occurs in the slab) on joist spacings closer than 30". The spacings for which loads are tabulated also require interpolation for use of standard form materials without cutting, such as 6", 8" or 10" boards, corrugated iron, etc.

The allowable unit stresses in the concrete and steel should conform to Sections 305 and 306 of American Concrete Institute Document 318-41 "Building Regulations for Reinforced Concrete."

SOURCES OF SUPPLY—The omission of any name from this partial list of manufacturers emphatically is not to be construed as an indication that such omission is because his product in any way lacks merit.*

Alabama Cement Products Co.	Birmingham, Ala.
Anchor Concrete Products	Buffalo, N. Y.
Basalt Rock Co.	Napa, Calif.
Bedford Hills Concrete Products Co.	Bedford Hills, N. Y.
Cambridge Cement Stone Co.	Alston, Mass.
Carter-Waters Co.	Kansas City, Mo.
Cedar Rapids Block Co.	Cedar Rapids, Iowa
Chandler Materials Co.	Tulsa, Okla.
Chase Building Products, Inc.	Fort Worth, Texas
Choctaw Culvert & Machinery Co.	Memphis, Tenn.
Cinder Block Co.	Richmond, Va.
Comac Builders Supply Corp.	Rochester, N. Y.
Concrete Products Co.	South Bend, Ind.
The Dextone Co.	New Haven, Conn.
Formigli Arch. Stone Co.	Philadelphia, Pa.
Graystone Concrete Products Co.	Seattle, Wash.
Haycom Tile Co.	Detroit, Mich.
Hud-Cin Build. Prod., Inc.	Westfield, N. J.
Ideal Cement Stone Co.	Omaha, Nebr.
Ketchin Brick & Tile Co.	Fort Lauderdale, Fla.
J. E. Kirkham	Topeka, Kans.
Wm. F. Koenig & Co.	Cincinnati, Ohio
Markle Cement & Coal Co.	Muskegon, Mich.
G. W. McDearmon	Baton Rouge, La.
Nashville Breeko Block Co.	Nashville, Tenn.
North Shore Concrete Joist Co.	Skokie, Ill.
H. B. Olney, Inc.	East Chicago, Ind.
Precast Unit Co.	Kalamazoo, Mich.
Geo. Rackle & Sons Co.	Cleveland, Ohio
Southern Cast Stone Co., Inc.	Knoxville, Tenn.
Spickelbeier Fuel & Supply Co.	Indianapolis, Ind.
Wailes-Bageman Co.	Los Angeles, Calif.
Wilbee Concrete Prod. Co.	Jackson, Mich.

*Note should be made of the Lith-I-Bar (patented) joist which is machine rolled in 6", 8", 10", 12", 14" depths for spans up to 36'-0", licensed to manufacturers by W. E. Dunn Manufacturing Company, Holland, Michigan.

LOCAL SERVICE — Fill in the blank spaces provided below with the names of manufacturers' local representatives who can help in problems involving this product.

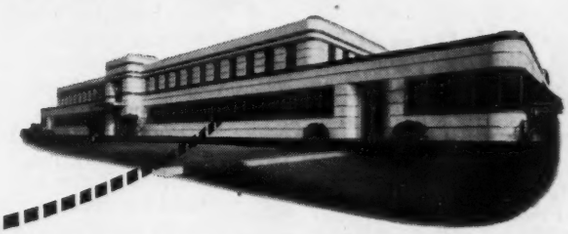
Product _____
Local Agency _____
Representative _____
Address _____
Telephone _____

Product _____
Local Agency _____
Representative _____
Address _____
Telephone _____

These data represent accepted practice in manufacture but do not necessarily mean that such products are currently available for civilian use.

ACROSS THE VOLTURNO

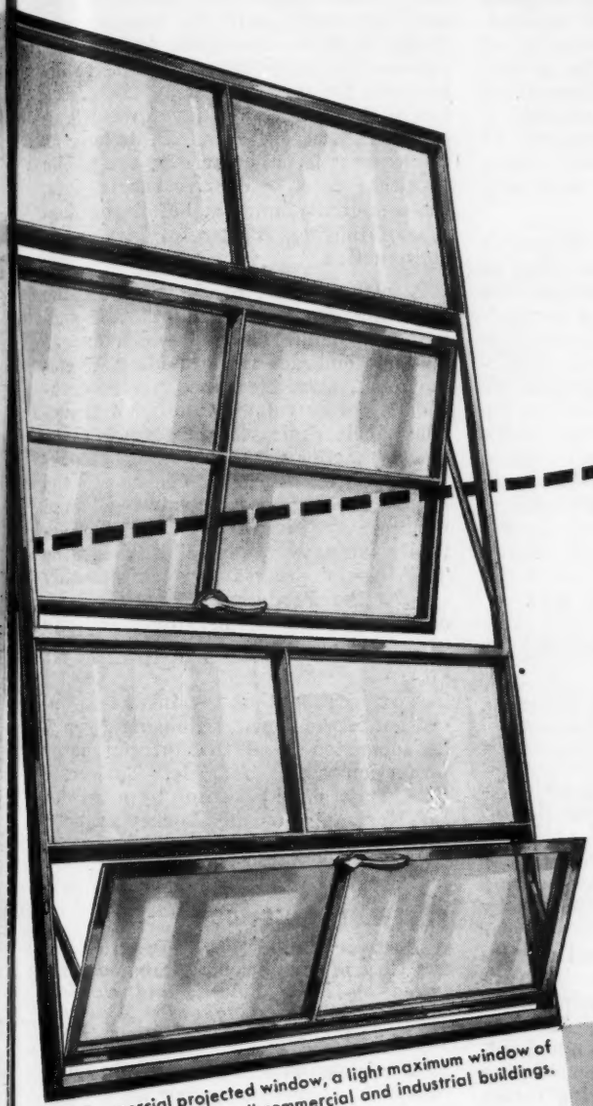
The Engineering skill, that produces the CECO STEEL WINDOW ...now makes possible the Bailey Bridge... spanning enemy streams on all fronts.



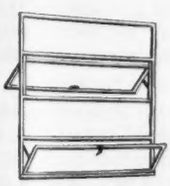
A "bridge of windows"? Yes, in a sense... for into the Bailey Portable Panel Bridge have gone all the skill and "know how" we have acquired in manufacturing the Ceco precision-engineered Steel Window.

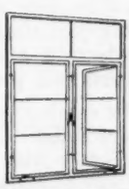
A remarkable engineering feat... this bridge that can be assembled like a giant erector set... by a surprisingly small group of men... to reach gaps up to 200 feet in only a few hours. It is rolled out in 10 foot sections from one bank of a stream and because of the perfect (no tolerance) fit of the sections, will support terrific loads.

The Ceco Steel Window, like the Bailey Panel Bridge, is precision built and durable. For Ceco engineers build "small" with the same precision they build "big". This skill and exactness gives the Ceco window important lasting advantages in installation and operation. They assure longer life and greater beauty. For commercial, school, factory, or hospital builder, Ceco construction products and Ceco Steel Windows do a better job through precision engineering.



Ceco Commercial projected window, a light maximum window of proven adaptability for all commercial and industrial buildings.





Ceco's line of Steel Windows includes Light and Intermediate Casements, Basement Windows, Architectural Projected, Commercial Projected and Pivoted Windows, Continuous Windows, Security and Utility Windows, Mechanical Operators, etc.

OTHER CECO ENGINEERED PRODUCTS:

Types of Steel Doors, Metal Frame Screens, Metal Lath, Metal Weatherstrips, Steel Joists, Steel Roof Deck, Meyer Steelforms, Adjustable Shores and Clamps, Concrete Reinforcing Bars and Welded Fabric.

CECO STEEL PRODUCTS CORPORATION

General Offices: Omaha, Nebraska

Manufacturing Division: 5701 W. 26th St., Chicago, Ill.

What the CECO engineered window means to Architect, Constructor and Factory Worker

1. Precision Engineering means an extra tight all weather seal—keeps out cold, dust, rain—keeps heat in.
2. Precision Engineering means easy opening, and closing—no sticking, warping, or swelling. Ceco Windows always fit.
3. Precision Engineering means a far greater light area, lets more sunlight in, easier to see out.
4. Precision Engineering means controlled ventilation—you'll always catch stray breezes—control draughts.
5. Precision Engineering means permanence—Ceco Steel Windows use more steel, last the lifetime of your factory.
6. Precision Engineering means Bonderizing, a special process for sure protection against paint failure and rusting.
7. Precision Engineering means all these important advantages at no premium cost!

MAKES THE BIG DIFFERENCE IN CECO CONSTRUCTION PRODUCTS

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Reviewed by Rita Davidson and William Smull

AIRPORT DESIGN

Modern Airfield Planning and Concealment. *By Merrill E. DeLonge, Major, AAC. Preface by Col. Homer Saint-Gaudens. Pitman Publishing Corporation, New York, 1943. 167 pp. plus viii. 123 figures. $4.00.*

Airport Reference, 1944-45. *Fourth Annual Edition. Occidental Publishing Company, 304 South Broadway, Los Angeles 13, Calif. 112 pp.*

Here are two volumes which approach the planning of airfields from differing viewpoints. Perhaps it is surprising that the more war-conscious book, by Major DeLonge, indicates a greater sense of the community problems involved in airport design. The annual—*Airport Reference*—considers the design and construction of airfields from almost an exclusively civilian standpoint and emphasizes the installation of the newest and most efficient of mechanical devices; it indicates only a slight realization of the effect an air base—civilian or military—has on its surrounding countryside and vice versa.

Modern Airfield Planning and Concealment stresses an intelligent, rational approach to decreasing the visibility of air establishments to enemy bombardiers. The selection of naturally suitable sites, the retention of as much of the natural terrain as possible, the consideration of the entire surrounding area from the point of view of possible "aiming guides" as well as dispersed servicing lines, and the practice of dispersing parked aircraft and base buildings are all emphasized as helping to produce easily camouflaged and inexpensive airfields. Such a plan of operations requires intelligent designers. In many cases, Major DeLonge points out, it will also require the services of architects, town planners (to work out the roads and railways as well as concealed subdivision patterns), agronomists, and other agricultural experts (to help develop good, easily camouflaged turfs and other vegetation), as well as engineers (who would strive to utilize natural aspects of the land). The writer insists that informal, irregular layouts are more simply and cheaply concealed than formal, though sometimes efficient, arrangements; dispersed aircraft are less vulnerable to attack.

The Annual discusses airport design factors (physical plans, soil characteristics, costs, and financing), seaplane bases, and the mechanical and physical equipment of airfields. The discussions ignore the need for natural concealment and underestimate the scope of planning required to make the airport a part of the community. There is an unfortunate lack of appreciation of functional design. The products of technical research and industrial manufacture are viewed only in their individual significance.

The broader outlook of Major DeLonge's volume may be due to the fact that he has a viewpoint and a message. His desire (to have the natural concealment possibilities of terrain and construction materials considered in airfield design) leads him to consider all aspects of the problem; he realizes the need for over-all planning to achieve the large scale effects for national defense that he desires. And too, his wide travels and experience encourage him to suggest many improvements on American practice. The illustrations—photographs and drawings—are excellent and are well coordinated with the text.

THE PRODUCERS' COUNCIL ON HOUSING

Toward a Postwar Housing Program. *Prepared and Issued for Consideration in Determining Suitable Postwar Housing Legislation and Other Forms of Implementation by the Postwar Committee of the Producers' Council, Inc. (May 1944; reissued August 1944). 98 pp. Multilithed. $1.00.*

On the assumption that the housing needs of the people can best be met by the free enterprise system, the *Postwar Housing Program* goes all-out for increased private construction, intensification of remodeling and repairs, and a revamping of federal housing agencies. The FHA, in particular, is singled out, and attention is directed at achieving reduction of risk and stabilizing values in the construction industry.

"Filtering-up" is the Council's answer to direction construction by government for the lowest income groups. By this is meant "the movement of successive waves of occupants from poorer to better properties, as progressively, the former occupants of the better properties move on to even better accommodations. Of course the process is characteristic in residential real estate and is analagous to the successive ownership of automobiles."

The parallel to the automobile industry is difficult to substantiate thoroughly. It is a corruption of the whole purpose of land use planning to design dwellings for one income level and subsequently "arrange" for their occupancy by another group having radically different requirements. That is another form of what, at present, encourages blight and endangers adjacent properties. It works hardship on the now-famous one-third of our nation, the families with incomes of less than $1,200, who would be deprived of the opportunity ever to live in new accommodations tailored to their needs. Certainly, the architectural profession cannot condone a policy which mitigates against the design and construction of new, necessary dwellings. Concomitant to the above is a provision for rent assistance by government, furnished directly to the tenants instead of making use of the financial outlay for building purposes. It seems criminal, as long as the expense is to be borne by the public in either case, to deprive the tenants, the community, and the building industry, of the opportunity for large-scale construction.

City planners can hardly welcome the following: "In no cases should the purposes of public housing endeavors be made to embrace the providing of employment, slum clearance, the restoration of realty values, or other extraneous, albeit desirable purposes." Once again, "tactics without strategy" is being pushed. Redevelopment of the blighted cores of our cities is considered unnecessary inasmuch as it may actually "destroy the possibility for the 'filtering-up' process to work smoothly . . ." The Producers' Council apparently is offering the architects and city planners a non-stop ring-around-the rosy.

The suggestion that the insurance operation of the Federal Housing Agency be separated from that of purchaser protection seems feasible. To decide whether it should be done by a unit of the National Housing Agency or as a semi-public-service requires further study.

POSTWAR HOMEWOOD

A Postwar Public Works Program for the City of Homewood, Alabama. *Prepared by Polk, Powell, and Hendon, Engineers. Birmingham, Alabama, 1944. 36 pp., 18 maps, 19 charts. Free.*

It is commendable that a municipality of 7,397 persons occupying an area of 3.67 miles has prepared a postwar plan which passes "lightly over the theoretical aspects of planning and emphasizes the practical, everyday problems with which it must cope as soon as conditions will permit."

In coming to grips with down-to-earth problems, the planners submitted a modest but well delineated and complete study of their findings as well as a series of realistic recommendations. The assumption that the peak growth of the city will mean a tripling of the population, or about 20,000 persons by 1965, is the conditioning factor around which the report is centered. The community setting, mores, and history are analyzed, as well as physical and economic characteristics; and a method of financing is offered which causes no undue hardships. The study decidedly accomplishes what it set out to achieve, and should be a palatable prototype for the 2,100 or more other "Homewoods" of this country.

(In addition to a logical organization and substantiation of facts, there are

(Continued on page 100)

★ BETTER WIRING FOR BETTER LIVING ★

Something to be thankful for...

SHE "toils not, neither does she spin"—yet Solomon in all his glory never cooked a dinner like this one!

Yes, the Bjones family has *much* to be thankful for on this Thanksgiving Day—and every other day throughout the year.

Bill Bjones and little Oswald . . . not to mention "Barkus" the wistful wire-haired . . . are savoring the succulent delights of the wonderful feast to come.

As for Mary Bjones, her modern automatic electric range is doing wonders in timing the cooking, maintaining proper temperatures, preserving precious vitamins—without any effort, whatever, on her part.

• • •

All this is as it should be . . . thanks to the important part played by better wiring, in making this happy domestic scene possible.

To help you make certain that electrical equipment functions properly in the homes you design or build, the Westinghouse Better Homes Department offers you *free technical advice* on this important subject.

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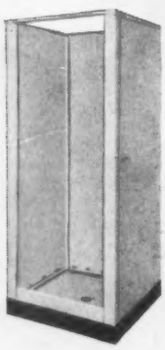
A step forward . . .

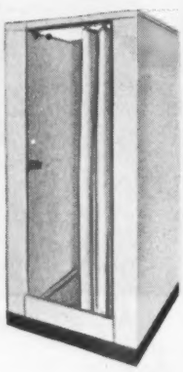
STANDARDIZATION

OF SHOWER CABINET AND GLASS DOOR SIZES

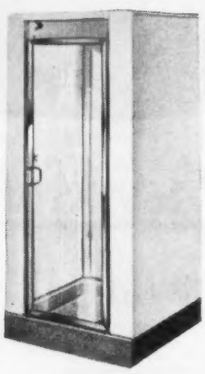
The standardization of shower cabinet and glass door sizes announced by Fiat marks a step forward in the industry that will be of definite benefit to the architect, builder, jobber and plumber. Standardization will expedite bathroom planning, make possible bigger values in showers, simplify jobbers stocks, and promote uniformity in installation methods. Fiat showers are classified into four groups with six basic sizes.



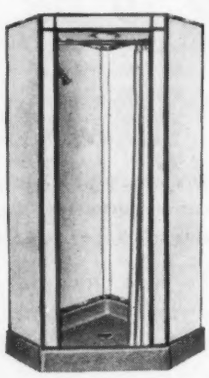
. . . GROUP NO. 1
Skipper type, low cost showers
32 x 32 x 76



. . . GROUP NO. 2
Cadet type, medium priced showers
32 x 32 x 80
36 x 36 x 80
36 x 36 x 80 (corner)



. . . GROUP NO. 3
Marine, Ensign type, for "above average" installations
32 x 32 x 80
36 x 36 x 80
40 x 40 x 80 (corner)



Measurements conform to the American Institute of Architects 4" unit module system.

Glass Shower Doors
One standard size—
24 x 72

GROUP NO. 4.....
Admiral type, de luxe class
32 x 32 x 80
36 x 36 x 80
40 x 36 x 80
36 x 40 x 80
40 x 40 x 80 (corner)

AVAILABLE FOR DELIVERY NOW

NO. 85—Recommended for homes, clubs, hospitals or public buildings. Size 36 x 36 x 78. Deep type receptor —heavy ¼" MASONITE walls.

NO. 80 Volunteer—has remarkable strength and is easily erected. A good shower for economical installations. Size, 32 x 32 x 76 and 30 x 30 x 76.

FIAT

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Reviews

(Continued from page 98)

sufficient maps and tables to provide the visual assistance so necessary to city planning documents.)

IN DURER'S WAKE

Were You There When They Crucified My Lord. *Illustrated by Allan Rohan Crite. Introduction by Kenneth John Conant. Apologia by Allan Rohan Crite. Harvard University Press, 1944. 39 plates. $3.00.*

Allan Rohan Crite has interpreted one of the best known of all Negro spirituals in pen-and-ink drawings keyed to the lines of the song. The plates are not mere illustrations; they are a dynamic sequence of action pictures from the Bearing of the Cross to the Ascension; each is in balanced inter-relationship.

The realistic approach toward religious events, so deeply a part of spirituals, is well portrayed by these drawings. Christ, the central motif, is maintained in a dominant position; the onlookers are easily understood. Mr. Crite, by a subtle blending of ancient and contemporary backgrounds and clothing, expresses symbolically that even today men and women have "stepped out of the crowd" to render assistance to the oppressed.

ON WASHINGTON, D. C.

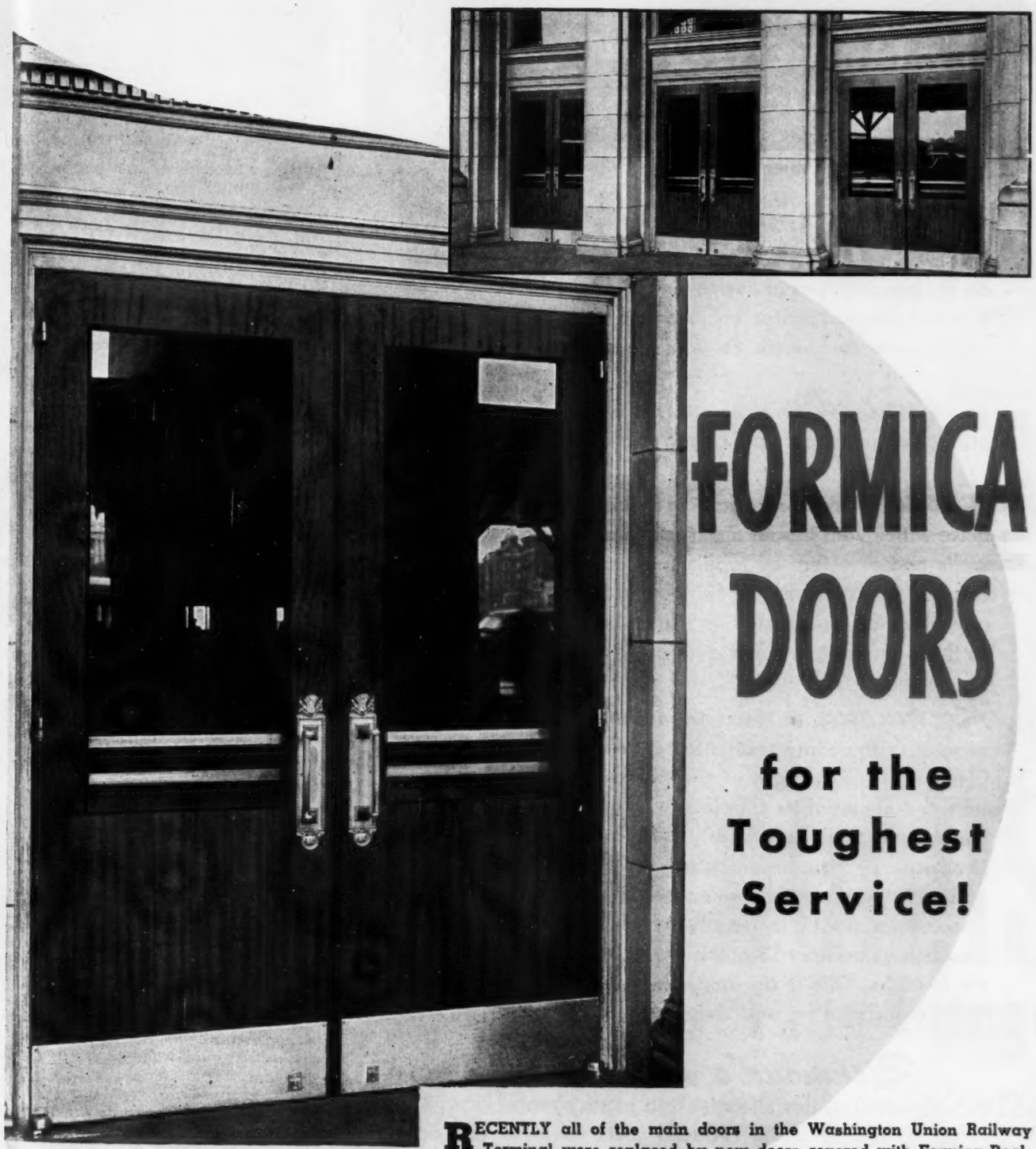
Aesthetic Standards for the National Capital. *An address by Gilmore D. Clarke, Chairman, National Commission of Fine Arts, at a meeting of the Joint Committee on the National Capital. February 1944.*

It is difficult to define just exactly what is said in this address, but the general impression is that Washington, D. C., its beauty and greatness, are to be well guarded forever against any architecture too indicative of the temper of these times, that the middle (or behind the middle?) way is necessarily the best.

Joint Committee on the National Capital. *Bulletin on Washington Developments. Office of the Secretary, 901 Union Trust Bldg., Washington, D. C.*

This is a report of the second annual conference on Washington, held by the Fine Arts Commission and the Park and Planning Commission. It is worth while to note the member societies: American Institute of Architects, American Federation of Arts, American Institute of Planners, American Planning and Civic Association, American Society of Engineers, American Society of Landscape Architects, Garden Club of America, National Association of Real Estate Boards, National Society of Mural Painters, National Sculpture Society. This is a hopefully representative membership to tackle the tasks this

(Continued on page 102)



FORMICA DOORS

for the Toughest Service!

RECENTLY all of the main doors in the Washington Union Railway Terminal were replaced by new doors covered with Formica Realwood veneer. This application followed successful use of similar Formica doors over a period of many years in the Pennsylvania Station at New York, and Newark, New Jersey, as well as many bus and air terminals.

It is typical of the kind of tough, surface-destroying applications which have been selected of late years for Formica by leading architects. And Formica stands the service and remains as good looking after years as it was when installed.

Formica Realwood veneers are actual wood impregnated with plastic resins, which render them non-absorbent, chemically inert, harder than marble. They are very easy to clean—soap and water, solvents may be used on them without injury.

Complete details and materials necessary for writing specifications will be sent on request.

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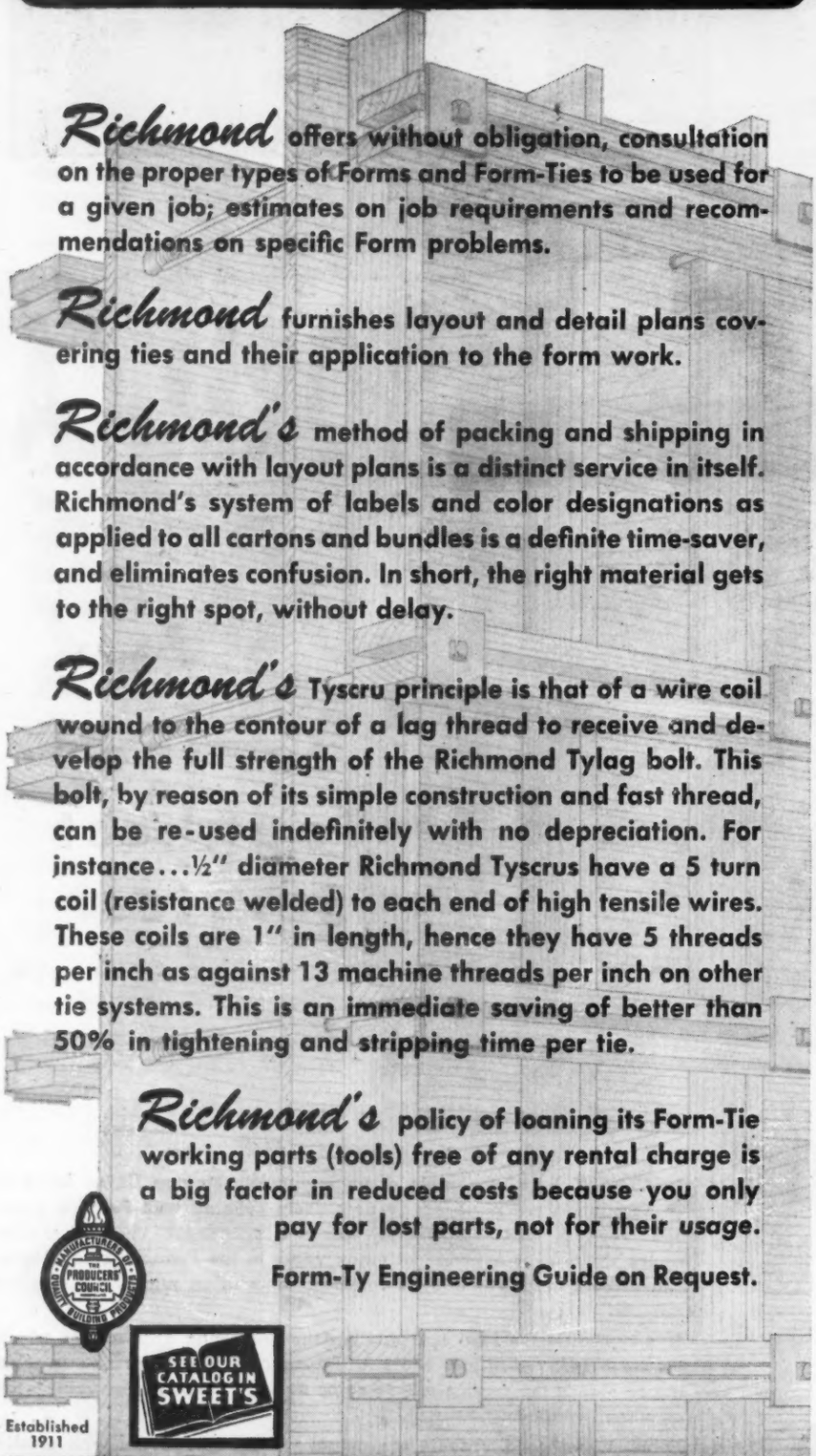

Richmond offers without obligation, consultation on the proper types of Forms and Form-Ties to be used for a given job; estimates on job requirements and recommendations on specific Form problems.

Richmond furnishes layout and detail plans covering ties and their application to the form work.

Richmond's method of packing and shipping in accordance with layout plans is a distinct service in itself. Richmond's system of labels and color designations as applied to all cartons and bundles is a definite time-saver, and eliminates confusion. In short, the right material gets to the right spot, without delay.

Richmond's Tyscru principle is that of a wire coil wound to the contour of a lag thread to receive and develop the full strength of the Richmond Tylag bolt. This bolt, by reason of its simple construction and fast thread, can be re-used indefinitely with no depreciation. For instance...½" diameter Richmond Tyscrus have a 5 turn coil (resistance welded) to each end of high tensile wires. These coils are 1" in length, hence they have 5 threads per inch as against 13 machine threads per inch on other tie systems. This is an immediate saving of better than 50% in tightening and stripping time per tie.

Richmond's policy of loaning its Form-Tie working parts (tools) free of any rental charge is a big factor in reduced costs because you only pay for lost parts, not for their usage.

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TIME AND LABOR SAVING CONSTRUCTION DEVICES FOR CONCRETE CONSTRUCTION

Reviews

(Continued from page 100)

meeting has outlined for improvement of the capital city. The program as given here is still in the general discussion stage.

The Nation's City. *An address by Charles D. Maginnis, Past President, American Institute of Architects, at a meeting of the Joint Committee on the National Capital. February 1944.*

After many flattering generalities on the history of planning in Washington, Mr. Maginnis comes to the conclusion, in his final paragraph, that this new mode of thought called modernism which "protests its validity" by professing "to interpret with superior logic the disposition of the time," will be a "disturbing presence in so orderly a household," and indecorous in such a great city as Washington.

Perhaps Mr. Maginnis believes, as he has hinted here, that Europe has still to be persuaded that we are a cultured nation, and that by insuring the classic tradition in our capital city, we will appear as full of glory as the ancients. We mimic.

Federal Works for the Federal City. *An address by Maj. Gen. Philip B. Fleming, Administrator, Federal Works Agency, at a meeting of the Joint Committee on the National Capital. February 1944.*

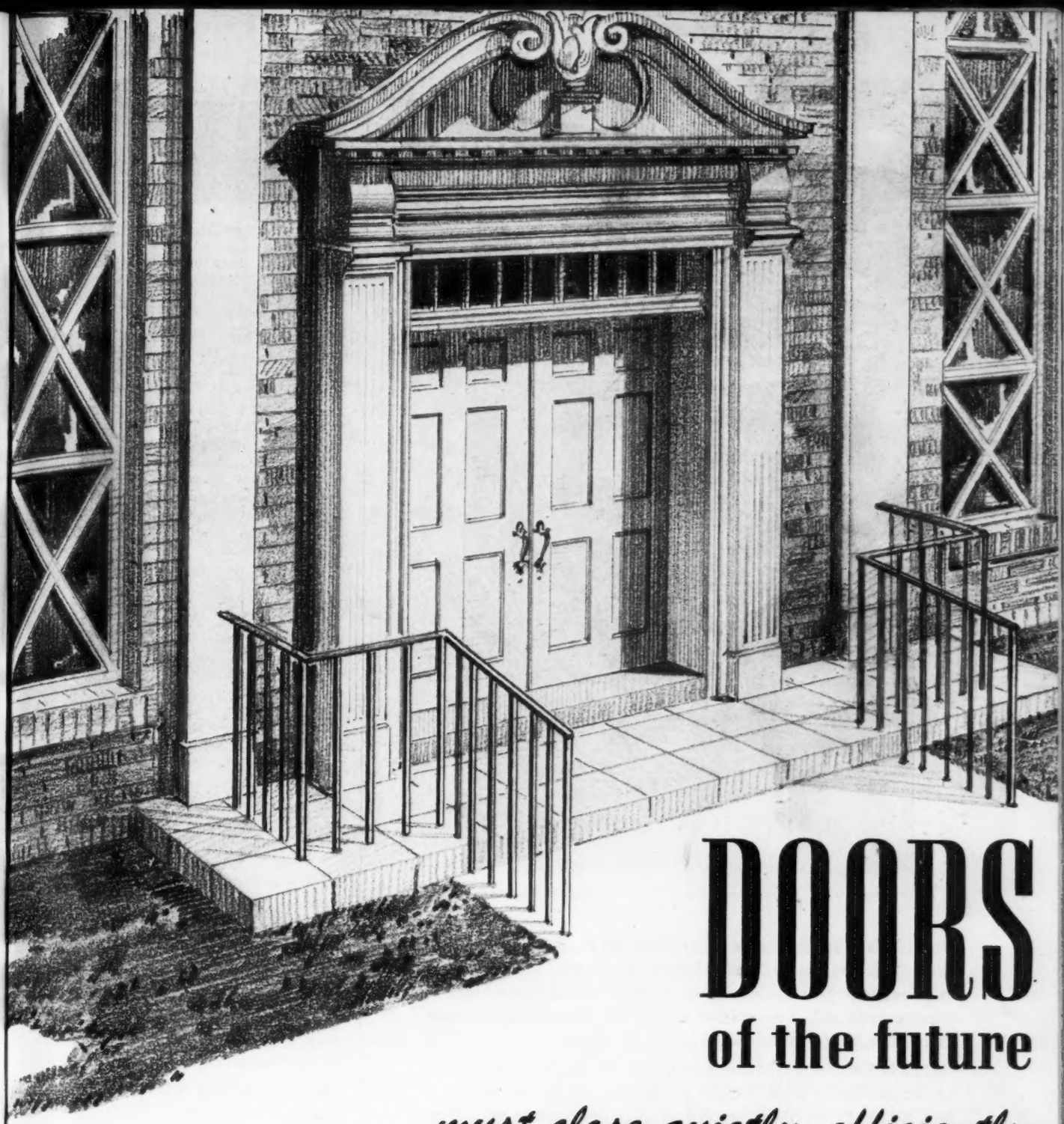
The best news contained in this report is that all temporary war buildings still standing, not only from this war but from the last one also, will be promptly demolished as soon after the war as men can be secured to do it. There will not be enough office space in Washington (even when the war's over) and the erection of several new buildings is necessary because of the increasing size and complexity of the numerous agencies. Projects for bridges and new highways costing from two to seven million dollars are, many of them, already on drafting boards; and a great number of small projects, to cost the taxpayer about $200,000 each, are in the planning stage. General Fleming feels that when these are completed, Washington "again will become foremost among the most beautiful capitals of the world, and one of the most convenient in which to live and work."

HOUSING STANDARD HOUSE ORGAN

Vallejo Housing Standard. *April 1944. Published by and for the employees of the Housing Authority of the City of Vallejo, Calif., P. O. Box 1432, Vallejo, Calif.*

This is the first issue of the "house organ" of the Vallejo Authority. Included are stories on the chefs for the dormitories, a report of a new union contract between the housing authority and the Office Workers' Union, and an

(Continued on page 104)



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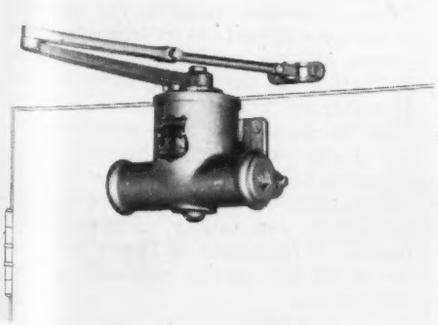

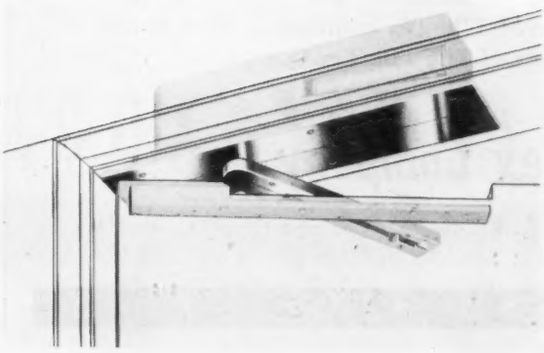

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Reviews

(Continued from page 102)

interesting story on the origin of the Mare Island Navy Yard.

THE CITY—TWO STUDIES

Cities in Flux. *By Catherine Bauer. Reprinted from the "American Scholar" (Vol. 13, No. 1, Winter 1943-1944), 12 East 44th St., New York 17, N. Y.*

At this time a great portion of our population is in a state of flux, caused by the change in locations of individuals brought on by war industries, and the realization of these same people that there are wider horizons than they had known before. It will be necessary to stabilize this now drifting population before any sound social system can be established. This stabilization can be partially but not wholly effected by a comprehensive plan, prepared locally but coordinated nationally, for each community. Outside the jurisdiction of laws and plans lies the element of personal whim destined to play a huge part in making or destroying the opportunity for a stable postwar national economy. Social security, health laws, educational facilities, wages, and individual manufacturers will also be determining factors.

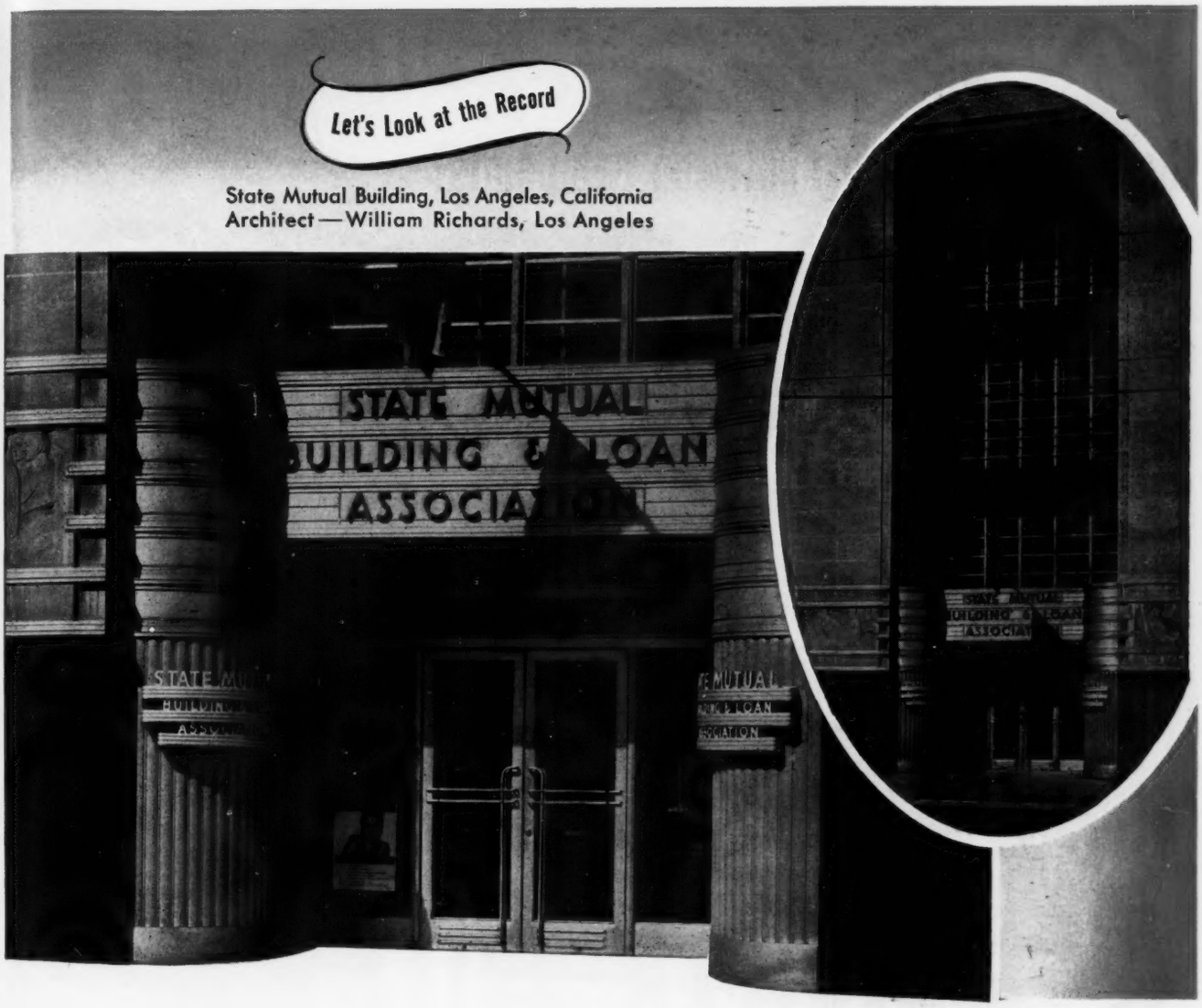
The Modern City. *By Ladislas Segoe, Planning Consultant. Buffalo City Planning Assoc., 158 Pearl Street, Buffalo, N. Y., March 1944.*

Here is a clearheaded survey of a city's assets and liabilities, and recommendations for that city's postwar development. Statistics for population, industry, etc., are not distorted to look more hopeful or discouraging than they are in actuality, and judging by the intelligence displayed in this report and the activity of the Planning Commission, Buffalo can hope for a forceful program of improvement for the postwar period.

PREFABRICATION VS. STANDARDIZATION

Prefabrication Explained. *American Houses, Inc., 570 Lexington Ave., New York 22, N. Y.*

Here is a lucid explanation of the often misunderstood prefabrication question. That prefabrication is needed as a "refining process, or more properly, a coordinating influence in the building industry, is demonstrated by the inability of most contractors to build inexpensive homes, and the known fact that standardization of parts and their partial assembly at the factory can cut building costs tremendously." One point not sufficiently covered is that standardization of parts and their prefabrication, and standardization of the total design of the house are totally different. The former is necessary to better housing, the latter will lead to rebellion against monotony.



From Los Angeles comes this word, "CONDITION OF ALUMINUM . . . EXCELLENT"

The designer called on most of the Alcoa Aluminum family of products to achieve the interesting and attractive effect you see here. He employed aluminum extruded shapes and castings, sheet, bar and tubing. The wisdom of his choice is evidenced by the fact that, after being on the job since 1931, the aluminum is reported in excellent condition today.

Note the well-kept appearance of this building, after these thirteen years of service. Very little labor was expended in keeping it looking that way.

Before the war, Alcoa Aluminum had earned an enviable reputation as a means of obtaining a great variety of effects. And architects were using it for its utility properties, giving building operators and homeowners the benefits of its long life and ease of maintenance. This wartime interlude, with manpower unavailable for proper upkeep, is serving as an excellent proving period. Alcoa Aluminum is coming through with flying colors. Gain these advantages by including Alcoa Aluminum in the structures you are now planning. ALUMINUM COMPANY OF AMERICA, 2198 Gulf Building, Pittsburgh 19, Pa.

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News

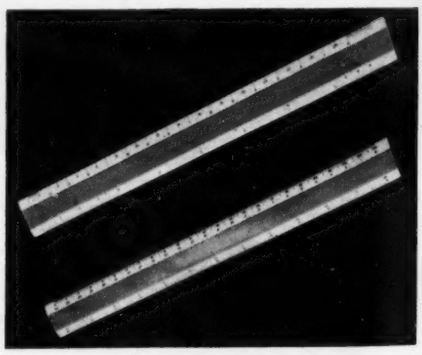
Products Progress

(Continued from page 24)

tight, and stretched on a frame; to admit more light than regular wire screening because the plastic wire itself lets in some light. For technical features and properties of the cloth, sizes and quantities available, see manufacturers' publications (page 000). At present the entire output of "Lumite" is going to the armed forces but, as soon as conditions permit, the Corporation plans to switch from war to consumer uses.

Plastic Drafting Instruments

Plastic slide rules, triangular scales, triangular relief facet scales, flat 4-bevel scales, protractors, are being quantity-manufactured by Pereles Bros., Inc., South 7th and East Arthur Streets, Milwaukee 7, Wis. The company reports they have been able to maintain



Lower scale is marked to indicate full size and half size.

on the various instruments, made of "Lucite," "Plexiglas," and "Polystyrene," a dimensional tolerance of one-half to one-thousandth of an inch per inch between lines as delicate as 3 to 3½ thousandths of an inch. On the 5-inch slide rule, dimensional tolerances are said to be held to even greater accuracies.

Automatic Clothes Dryer

An automatic clothes dryer, electric or gas, for homes and apartments, is a product of the Hamilton Manufacturing Company at Two Rivers, Wis. The dryer is 39" high, 31" wide, 25" deep, of steel with a white enamel finish; is insulated; is said to be quiet in operation and to require no lubrication. Clothes are revolved in a gentle, tumbling action; an automatic thermostat controls the heating element. An average washer

(Continued on page 108)

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Blueprint for a dream
Heartbreak house or a real home?
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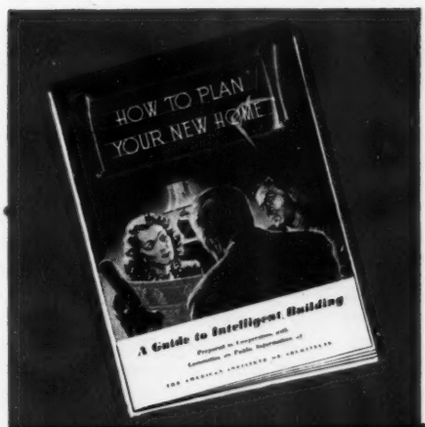
• The Edwards campaign to stimulate business for the architect has produced concrete results! Over 60,000 home-planners have written for the booklet "How To Plan Your New Home"—a telling argument for the architects' place in bringing their projects to a successful conclusion. Many times this number have read these advertisements, in national magazines, on the advantages of an architect-planned home.



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News

Products Progress

(Continued from page 106)

load of clothes is said to be damp-dry (ready to iron) in 15 to 25 minutes; complete drying takes slightly longer. The dryer eliminates lifting and carrying baskets of heavy, wet clothes to outdoor lines, protects them from soot, dust, smoke, germ-carrying flies, bad weather.

Explosive Rivets

The explosive rivet was first developed for quick, sure, "blind" fastening in hard-to-get-at places in aircraft. E. I. du Pont de Nemours & Company, Wilmington 98, Del., has developed an improved rivet for postwar uses; among these are the construction of prefabricated houses, and of units and duct-closing in heating, ventilating, and air conditioning. A rivet is made with a small explosive charge running the full length of the shank; this charge, when heated by an electric riveting iron, forms a barrel-shaped closing head and fills the hole through which it passes, making it unnecessary to drill rivet holes to such close tolerances as are normally required.

New Floor Brick

A floor brick, said to be non-slip, is announced by Empire Emery Corporation, 18 East 41st St., New York 17, N. Y. As a floor resurfacing, it is claimed to be an added safeguard against accidents; that it will step up production schedules; and that it will probably make possible reduction of insurance rates.

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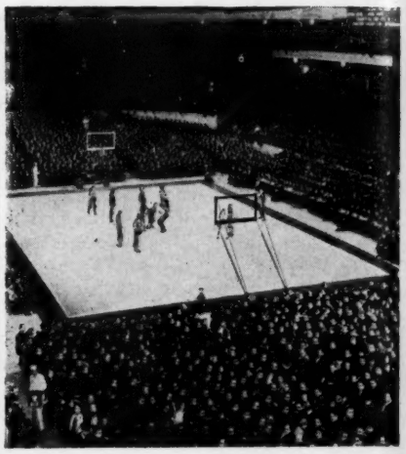
MADISON SQUARE GARDEN FLOOR



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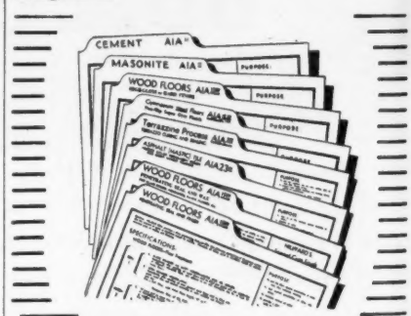

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In small homes, too, the use of copper and brass is equally important. No other metal offers the homeowner so much as copper in assuring protection, convenience, comfort and low upkeep. Roofs, flashings, gutters, downspouts and insect screens that can never rust. Water lines of brass pipe . . . or copper tubes that cost, installed, little if any more than rustable pipe. Water heaters with tanks of non-rust Everdur* Metal. Solid brass and bronze hardware for beauty and endurance.

Your client may *spend* a little more for copper and copper alloys, but he will get much more in lasting satisfaction and protection.

The skyline illustration above shows six of the many outstanding buildings rustproofed with Anaconda Metals. From left to right: The Russ Building, New York Central Building, RCA Building, Bank of Manhattan, Woolworth Tower and Fisher Building. Many millions of pounds of Copper, Brass and Bronze perform more than 50 distinct functions in these structures. 4412B

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ANACONDA

Anaconda Copper & Brass

Manufacturers' Literature

Air Conditioning

1-07. *Conduit Weathermaster System,* Carrier Corporation.

1-09. *The Servel All-Year Gas Air Conditioner* is a 16-page booklet from Servel, Inc., which discusses air conditioning by means of a single gas unit, steel enclosed. Diagrams, specifications, and descriptions cover the heating, refrigeration, and air cycles. Applications for this booklet should be made to your local utility company; if not available, apply to *Pencil Points.*

Air Express

1-08. *Air Express Now and Tomorrow,* Railway Express Agency.

Bulkheads

2-04. Six standard design types of all-metal fireproof cellar bulkheads are described and illustrated in a 4-page pamphlet, *Bilco Copper Steel Bulkheads,* from the Bilco Company. Bulkheads are of 12-gauge copper steel for frame or masonry construction; are shipped knocked down in 5 parts, and it is claimed they can be built into place in less than one hour when provision is made to receive them; they may be painted any desired color.

Communication Systems

3-15. *Holtzer-Cabot Communication Systems, A.I.A. File 28/11,* Holtzer-Cabot Electric Company.

Concrete

3-16. *Modern Developments in Reinforced Concrete (No. 10),* Structural Bureau of Portland Cement Association.

Conveyors

3-14. *Case Histories to Aid You in Blueprinting Conversion to Peace,* Lamson Corporation.

Crematories

3-17. *Crematories, Bulletin No. 150,* Morse Boulger Destructor Company.

Doors

4-08. A 12-page booklet on hangars, industrial, crane entrance, and hangar doors, movable steel partitions, is published by Byrne Doors, Inc. Plans, photos of installations, specifications, are given on motor-operated canopy doors, motorized slide doors, custom doors, standard and expeditionary hangars.

4-04. *Modernfold Doors for Homes,* New Castle Products.

4-05. *Doors by Roddis,* Roddis Lumber & Veneer Company.

4-06. *Roddis Wood Doors Approved for One Hour Fireproof Openings,* Roddis Lumber & Veneer Company.

4-07. *Truscon Steel Hangar Doors—Vertical Lift Canopy Type,* Truscon Steel Company.

Drafting Room Equipment

4-09. *Catalog 2A,* from Engineering Sales Company, is a 32-page, illustrated booklet (6 x 9) listing a complete line of equipment for the drafting room, from pencil pointers and drawing tables to splines. Sizes, order numbers, etc., are given.

Electrical Equipment

5-07. *Electrical Guide to the Post-War Home,* National Adequate Wiring Bureau.

Floors

6-07. *Floor Treatment and Maintenance Job Specifications,* Hillyard Company.

6-08. Pittsburgh Steel Company publishes a 16-page booklet on *Floor Lath Specifications and Welded Wire Reinforcement (A.I.A. 4 E25-20-B-1).* It is one of a group of selected data sheets describing Pittsburgh "Steeltex" building materials and giving directions for specific applications. Included are bracing details for steel joists and "Steeltex" application; table for safe loads, comparative test data; sizes, sectional areas and weights, and uses of welded wire reinforcement.

Flooring

6-09. *Orco Safety Treads and Flooring (A.I.A. File No. 23-H)* is an 8-page folder from Ohio Rubber Company, illustrating and describing hard and soft flooring containing Alundum abrasive aggregate for obtaining non-slip walking surface. These floorings are claimed to be bondable to any kind of sub-surface with a cement manufactured by the company, or may be anchored with screws or bolts. Sizes, colors, and designs are given.

6-10. *Resilient Floors (A.I.A. File No. 23j)* is a 144-page catalog on Nairn linoleum, published by Congoleum-Nairn, Inc., for architects. Recommended types of linoleum for specified types of building, such as commercial, school, hospital, store, church, residence, apartment, etc., are listed. Specifications for installation on underfloors of suspended concrete or wood, pre-cast gypsum plank, rough wood, wood on or below grade, concrete on or below grade, are given, as well as those on walls, stair treads and risers, etc. There are colored plates showing various patterns, and photographs of actual installations.

Glass

7-06. The versatility of Fiberglas is described in an 8-page illustrated consumer booklet, *Facts About Fiberglas for Design Engineers,* from Owens-Corning Fiberglas Corporation. Its primary uses are said to be in thermal insulation, sound insulation, air filtration, electrical insulation, industrial textiles, acoustical surfacing, etc. Products are listed with their forms and sizes, major properties, and principal uses.

Heating

8-16. *Cyclotherm Steam Generator,* Ames Iron Works.

8-21. *Bulletin G-34A* (boilers), Babcock & Wilcox Company.

8-24. *High-Altitude Heating for Buildings, Brochure 632,* published by C. A. Dunham Company, contains 24 pages of explanation, drawings, and photos on the Dunham sub-atmospheric steam heating. Functions and method of automatic differential zone and room control are discussed at length and presented in diagrams.

8-25. 8-page illustrated folder, *Iron Fireman Presents Coal-Flow Firing,* describes automatic bunker-to-fire feed coal stokers for commercial heating and power boilers. Photographs and reproductions of blueprints show typical applications, including installations from side and from rear of boilers. Advantages claimed are automatic coal handling with resulting labor savings, ease of cleaning fires, decreased fuel consumption, and automatic control of heating or steam pressure. Iron Fireman Manufacturing Company.

8-17. *Bison Steel Heating Boilers, Catalog No. 3,* Farrar and Trefts, Inc.

8-23. *Modine Horizontal Delivery Unit Heaters, Bulletin 144-A,* Modine Manufacturing Company.

8-20. *Modine Vertical Delivery Unit Heaters,* Modine Manufacturing Company.

8-18. *Low Pressure Sectional Cast Iron Boilers,* H. B. Smith Company, Inc.

8-19. *Performance Facts,* Warren Webster & Company.

8-22. *Personalized Heating Control for Apartments (A.I.A. File No. 30-F-2),* Minneapolis-Honeywell Regulator Company.

Incinerators

9-08. *Incinerators* (30 pages, illustrated) is a booklet composed of bulletins on incinerators of "all sizes, types, and for all purposes" from Joseph Goder Incinerators. Various types are shown in photographs, together with information on dimensions, installations, draft regulation, flue types, capacities.

Insulation

9-09. *Insulation and Your Home* (24 pages, 2 colors, 8½ x 10), National Mineral Wool Association, price 25 cents. This booklet has been prepared primarily for consumers and presents in a non-technical manner the case for insulation in general and mineral wool in particular. A number of charts, based on calculated heat losses, is included to show the economy and comfort obtained by means of insulation. Many will take issue with the use of calculated heat losses for 3-⅝" insulation as the basis for any savings estimate. From printer's proofs, the booklet promises to be very handsome and one which the architect may find useful to give to clients (with a word of explanation) when the clients seek enlightenment on the insulating question.

9-03. (Data sheets on insulation) Wood Conversion Company.

9-04. *Nu-Wood Roof Insulation,* Wood Conversion Company.

9-05. Wood Conversion Company publishes *Nu-Wood Insulating Lath Application Information,* a single sheet giving lath description, data on application, spacing, nailing, reinforcement, related provisions, and plaster application. Diagram and photos.

9-06. Wood Conversion Company also publishes *Nu-Wood Insulating Sheathing Application Information,* giving description, data on framing, application, nailing, wood siding, shingles, stucco, masonry veneer. Illustrated.

Joists

10-01. *Bethlehem Open-Web Steel Joists*

(A.I.A. File No. 13 G) is a 32-page illustrated booklet from Bethlehem Steel Company. Data are given on: beam anchors, open-web steel joists, extension rods, header angles, masonry wall anchors, metal lath, rigid bridging, sleeper anchors; as well as specifications, tables of marking systems for ordering, tables of properties and safety loads.

Lighting

12-08. Federal Electric Company, Inc., presents *Zeon Cold Cathode Fluorescent Lighting* in a 34-page consumer booklet of text and color plates on installations for high-level fluorescent illumination.

Maintenance

13-03. *From Foundation to Flagpole*, L. Sonneborn Sons, Inc.

Miscellaneous

13-06. With the increasing and war-tested importance of visual aid in education, training, and entertainment, a study of motion picture projection and public address systems equipment may be of value to designers of public assembly halls, schools, government and industrial buildings, stadiums, institutions, parks, etc. A 16-page consumer brochure, *Ampro Precision Cine Equipment*, describes such equipment, giving photographs of models, sizes, and technical data. From Ampro Corporation (recently merged with General Precision Equipment Corporation).

13-05. *How to Plan a Home Workshop*, consumer booklet, Delta Manufacturing Company.

Paint

16-13. *Paint Progress (A.I.A. File No. 25)*, New Jersey Zinc Company.

16-15. Research and experience in controlling light effects by the planned use of color are presented in *Color Power for Industry (A.I.A. File No. 25)*, a consumer booklet (18 pages) from Arco Company, paint manufacturers. Use of color to reduce eye fatigue and accidents is discussed and illustrated by means of eye tests and comparisons. The company offers services of a color representative to survey an entire plant, or work from blueprints for new construction, in planning for scientific use of color.

Piping

16-16. Tables and data on water pipe sizes of use to architects and engineers are contained in a 64-page illustrated booklet (8½ x 5½), *Water Pipe Sizes (A.I.A. File No. 29-B-4)* for plumbing installations with brass pipe or copper water tubing, revised edition, from Bridgeport Brass Company. Other pertinent information is given, such as water supply formulae, classification of drinking waters, and suggested architects' specifications.

16-12. *Revere Pipe and Tube*, Revere Copper and Brass, Inc.

Plastics

16-14. *Plaskon, Plastic Materials for Modern Industrial Production*, Libbey-Owens-Ford Glass Company.

Plumbing Fixtures

16-03. *Douglas Folders*, The John Douglas Company.

Roofing

18-01. A new roofing specification book for architects has been prepared by Koppers Company. It is so arranged that one comparable specification can be compared with another and differences easily seen. *Specifications No. 44* (36 pages) carries data and diagrams on new roof construction (flat or steep), re-roofing, insulation, flashings, waterproofing, and dampproofing.

Screening

19-13. *Lumite, the New Plastic Screen Cloth* (A.I.A. 35P) is a 2-page, illustrated folder describing the uses and features of this flexible, rust-, flame-, and corrosion-proof material which is to be available after the war. Chicopee Manufacturing Corporation.

Skylights

19-12. An indexed group of detailed drawings on various skylight installations of wire glass is presented in a 24-page illustrated booklet (8⅜ x 11), *Original Solid Corrugated Wire Glass, Skylights, Sawtooth and Sidewall Construction, No. 8*, from Pennsylvania Wire Glass Company. Installation specifications are included.

Temperature Control

20-05. *Thermoswitches for Complete Temperature Regulation*, Fenwal, Inc.

Tile

20-04. *Facts About Tile* is a 20-page booklet from the Tile Manufacturers' Association, Inc., said to "remind you of some of the things you have always known about ceramic tile," and illustrating tile as used in various types of interiors and exteriors. Stating that "Your architect is the man who will show you how to 'stretch your dollars' without sacrificing performance and satisfaction . . . His judgment is *unbiased*," the booklet gives pertinent information on the history of tile, its cost, installation, care, modern uses, etc.

Toilet Compartments

20-08. *Weisteel Metal Compartments 17/13*, a 4-page illustrated pamphlet from Henry Weis Manufacturing Company, Inc., illustrates and describes metal toilet compartments which, however, will not be available until after the war. Brief forms of architects' specifications are given, together with descriptions of compartment types, such as ceiling-hung, panel, flush, etc. The company also makes flush doors and hardware for marble, glass, and similar partitions, and panel and flush type hospital cubicles.

Trim

20-07. *Condensed Catalog No. 1*, from R. D. Werner Company, Inc., contains data on aluminum trims and sink-well frames, especially timely in view of the recent release of aluminum for trim and moulding use. The catalog (4 x 9, 16 pages) carries data on and description of "Chromtrim" as a decorative moulding, and gives instructions on ways of bending it or forming turns.

Tubing

20-06. *Tube Data* (steel), Seamless Steel Tube Institute.

Walls

23-18. *Steel Mobilwalls*, Snead & Company.

Welding

23-20. *Fleet-Welding* is a 48-page illustrated manual to assist users of arc welding in establishing proper welding procedures and procedure control. The process is said to be a method for increasing the speed of welding mild steel and for producing "full strength joints at minimum cost." Lincoln Electric Company.

Windows

23-19. *How and Where to Use More Windows*, Curtis Companies, Inc.

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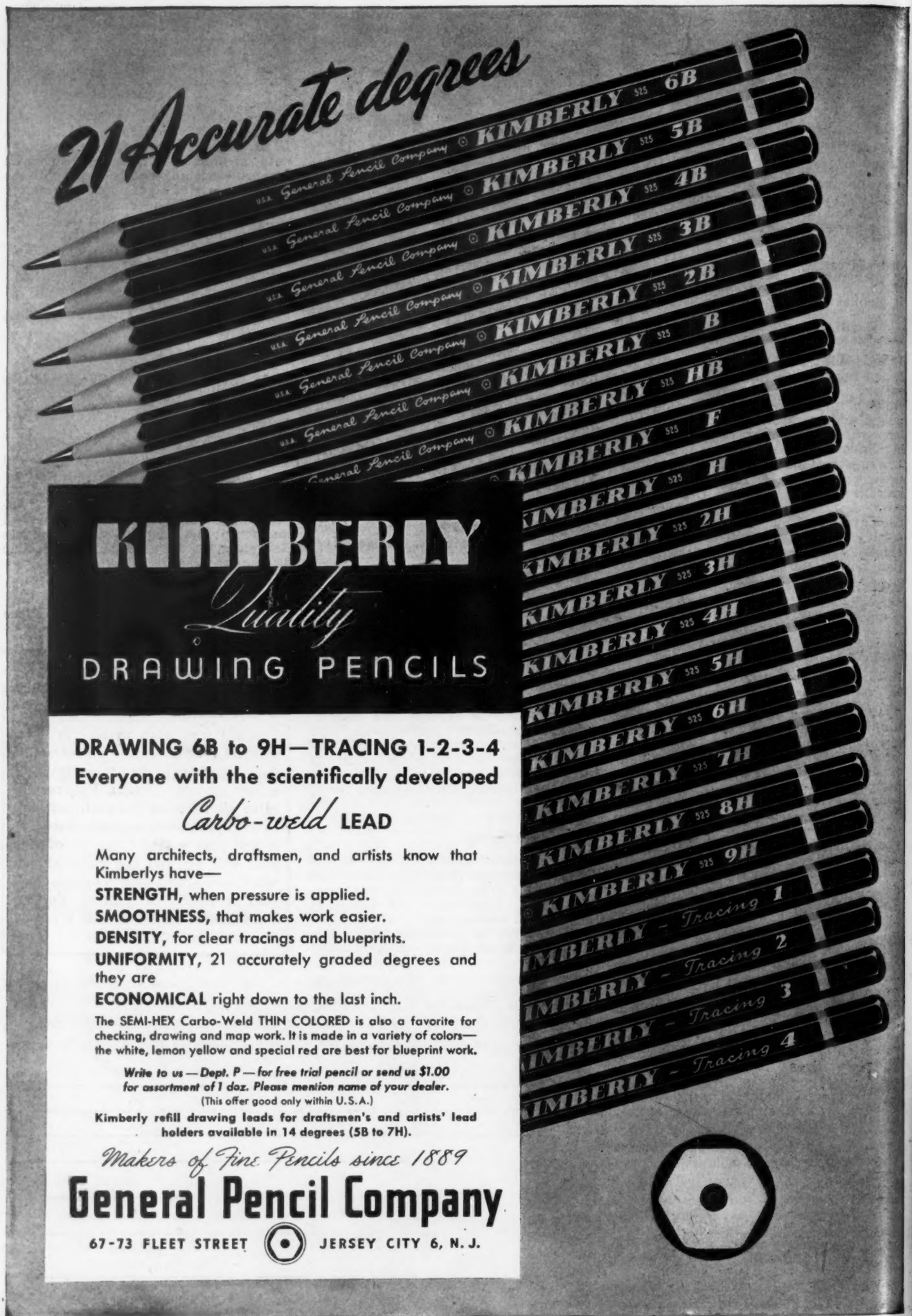

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